

SYSTEM MODELLING

Data Flow Diagrams

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System Modelling - DFDs

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Large complex systems are difficult to understand.

Structured analysis methodologies try to overcome this problem by:

- partitioning the system into components
- constructing *a model* of the system

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What is Structured Analysis?

- Focuses on specifying *what* the system is required to do
- Shows us the logical elements of a system
- Does not show the physical elements of a system (computers, storage systems, etc.).
- Analysis is used later to produce a physical design for the system.

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Elements of Structured Analysis

A narrative description of large systems tends to be tedious & error prone.

- Outline of system features.
- Description of system functions.
- Interaction with other elements.
- Details *can* be omitted or ambiguous.

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Instead of words, symbols may be used.
A *graphic model* of the system is produced.

A Graphic Description

- Does not show details of storage mediums or program and operating procedures.
- Makes it easy for anyone to understand how the components in a system fit together.

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Data Flow Diagrams

Also referred to as a *system model*.

A full description of a system consists of a *set* of data flow diagrams (DFD's).

Start with a high-level overview model.

This is then 'Exploded' into *several* lower level diagrams.

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Basic Elements of a DFD

The following 4 elements are found on a DFD (system model):

- Data Sources & Destinations
- Processes
- Data Stores
- Data Flows

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The top level diagram shows little or no detail about the features of the system.

The lower level diagrams show the additional features of the system.

Each process may be broken down into even more detailed DFDs.

Keep refining (exploding) a diagram until a sufficient level of detail is reached.

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Data Analysis

Before you draw a system model, you must determine:

- What processes make up a system ?
- What data are used in each process ?
- What data are stored ?
- What data enter & leave the system ?
- Where does data come from or go to ?

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The earlier requirements analysis and specification tasks have identified:

- The functional requirements of the system
- Data requirements (high-level)
- The data stores required by the system

This information is used as an input to the system modeling activity.

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DFD Notations

Two of the more popular DFD notations used are:

- Yourdon
- Gane & Sarson

They are logically the same, but the symbols used on the diagrams are different.

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External Entities

What is an External Entity?

- Group(s) of things or people which
- Represent a SOURCE or DESTINATION of inputs or outputs to/from the system.

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External entities are outside the system.

- A member of a DVD rental company
- A customer buying goods
- A patient at a medical practice

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The system designer has no control over these entities.
The system can not predict when these entities might interact with it:

- When will a member rent a DVD?
- When will a customer buy some goods?
- When will a patient make an appointment?

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An external entity is represented by a rectangle.

The rectangle should contain a brief, meaningful label.

Member

Customer

Patient

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Processes

What is a process?

- One or more activities that transform data.e.g. calculating/updating/selecting
- Processes must be described by an **ACTIVE VERB + NOUN** (description of data being processed)

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Some examples of process names:

- Prepare Order
- Print Cheque
- Record Sale
- Register Member
- Rent DVD

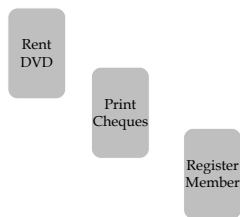
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Some examples of *poor* process names:

- Log order received in system
- Multiply hours worked by hourly rate
- Members
- DVDs overdue
- Account Lodgements

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A process is represented by a rectangle with **rounded** corners.



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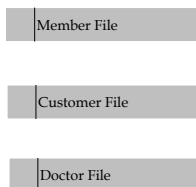
Data Stores

What is a data store?

- Where data is permanently stored.
- Represents data at rest.
- Contains data needed by the system in order for it to function.
- Described by a meaningful *name*

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A data store is represented by a rectangle with *two* compartments.



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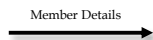
Data Flows

What is a data flow?

- Represent data in motion.
- Show the movement of data through the system
- Labelled appropriately

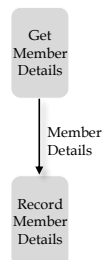
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A data flow is represented by a uni-directional arrow



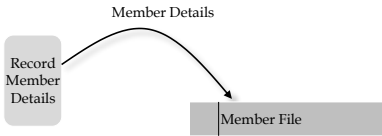
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Data may flow between two processes:

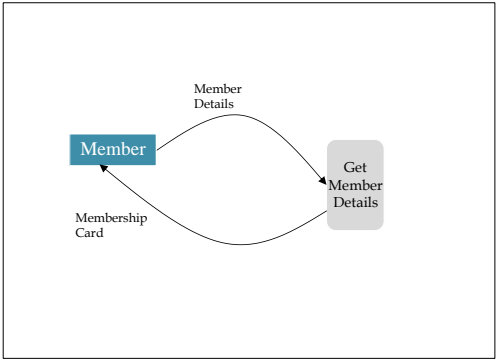


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Data may flow between a process and a data store

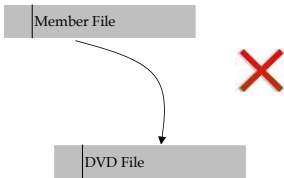


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Data can not flow between two data stores



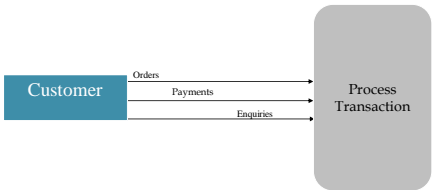
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Rules for DFD's

- Names in symbols should be brief
- Process names must use active verb + noun
- Data flows *must* be labeled - all of them and they must show the direction of flow

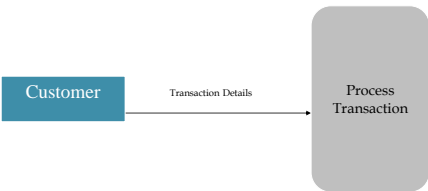
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Consider the following:



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This would be better represented as:



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Drawing DFD's

Identify the following from the user/ sytem requirements:

- External Entities
- Data Stores
- Processes

A Very Simple Example

A customer wishes to obtain a statement of account from his/her bank.

Once the enquiry is made, the customer file and the account file are checked to verify the customer and account number, the transaction details for the account are retrieved from the transaction file and the account details printed on a statement which is then sent to the customer.

Solution

- External Entities:** Customer
- Data Stores:** Customer File
Account File
Transaction File
- Processes:** Process Request
Print Statement

