DATA FLOW DIAGRAM - DFD

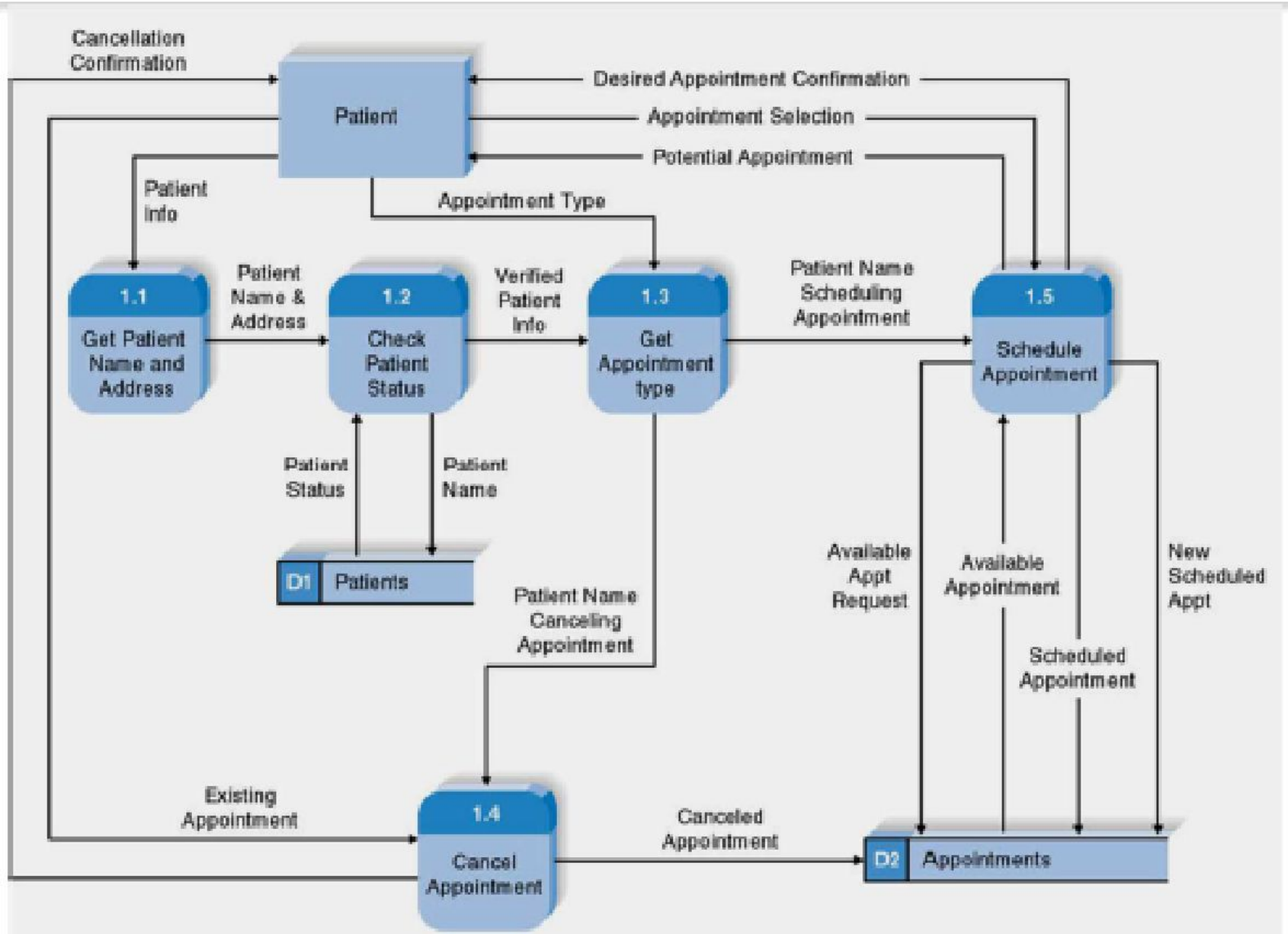
Key Definitions

- Process model
  - A formal way of representing how a business system operates.
  - Illustrates the activities that are performed and how data moves among them.
- Data flow diagramming
  - A common technique for creating process models

Key Definitions

- Logical process models describe processes without suggesting how they are conducted.
- Physical process models provide information that is needed to build the system.

DFD example


Cancellation Confirmation
Patient
Desired Appointment Confirmation
Appointment Selection
Potential Appointment
Patient Info
Appointment Type
1.1
Get Patient Name and Address
Patient Name & Address
1.2
Check Patient Status
Verified Patient Info
1.3
Get Appointment type
Patient Name Scheduling Appointment
1.5
Schedule Appointment
Patient Status
Patient Name
D1
Patients
Patient Name Canceling Appointment
Available Appt Request
Available Appointment
New Scheduled Appt
Scheduled Appointment
Existing Appointment
1.4
Cancel Appointment
Canceled Appointment
D2
Appointments

Elements of a DFD

- Process
  - An activity or function performed for a specific business reason.
  - Manual or computerized.
- Data flow
  - A single piece of data or a logical collection of data.
  - Always starts or ends at a process.

Elements of a DFD

- Data Store
  - A collection of data that is stored in some way.
  - Data flowing out is retrieved from the data store.
  - Data flowing in updates or is added to the data store.
- External entity
  - A person, organization, or system that is external to the system but interacts with it.

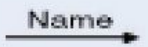
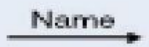
Elements of a DFD

Process

Data flow

Data store

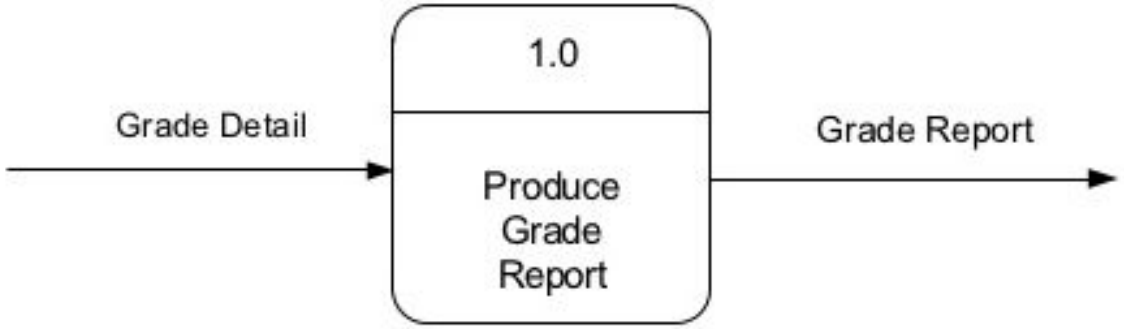
External entity

Data Flow Diagram Element	Typical Computer-Aided Software Engineering Fields	Gane and Sarson Symbol	DeMarco and Yourdan Symbol
Every *process* has A number A name (verb phase) A description One or more output data flows Usually one or more input data flows	Label (name) Type (process) Description (what is it) Process number Process description (Structured English) Notes		
Every *data flow* has A name (a noun) A description One or more connections to a process	Label (name) Type (flow) Description Alias (another name) Composition (description of data elements) Notes		
Every *data store* has A number A name (a noun) A description One or more input data flows Usually one or more output data flows	Label (name) Type (store) Description Alias (another name) Composition (description of data elements) Notes		
Every *external entity* has A name (a noun) A description	Label (name) Type (entity) Description Alias (another name) Entity description Notes		

Using a DFD to Define Business Processes

- Business processes are too complex to be shown on a single DFD.
- Decomposition is the process of representing the system in a hierarchy of DFD diagrams.
- Child diagrams show a portion of the parent diagram in greater detail.

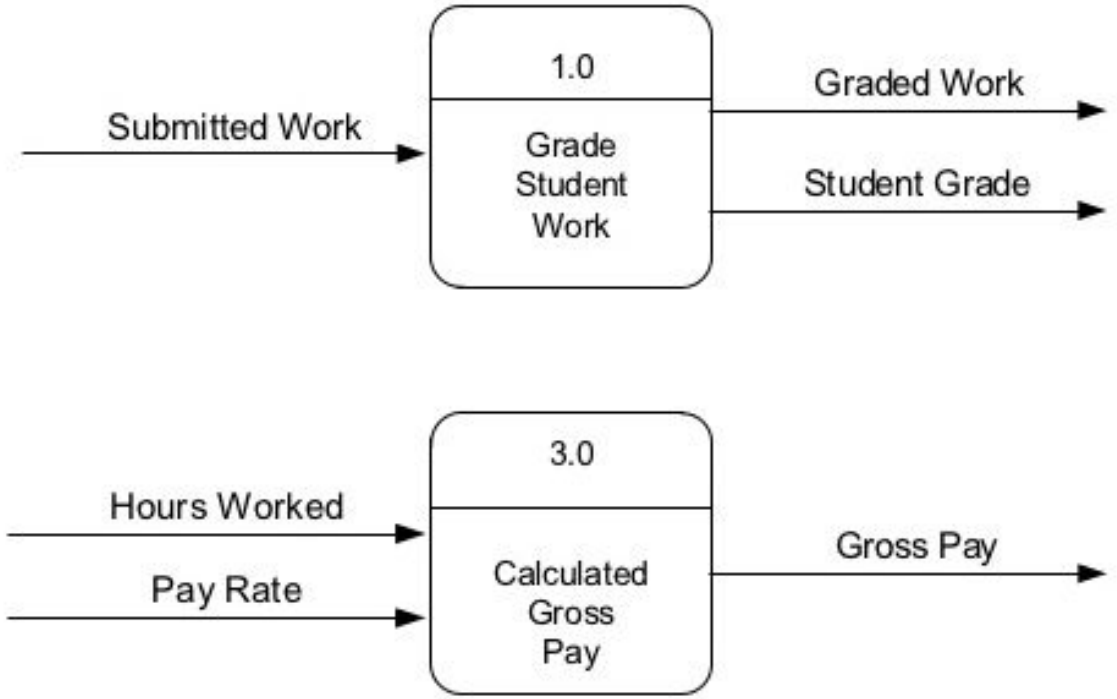
Process



- Work or action performed on data (inside the system).
- Labels should be verb phrases.
- Receives input data and produces output.

Process

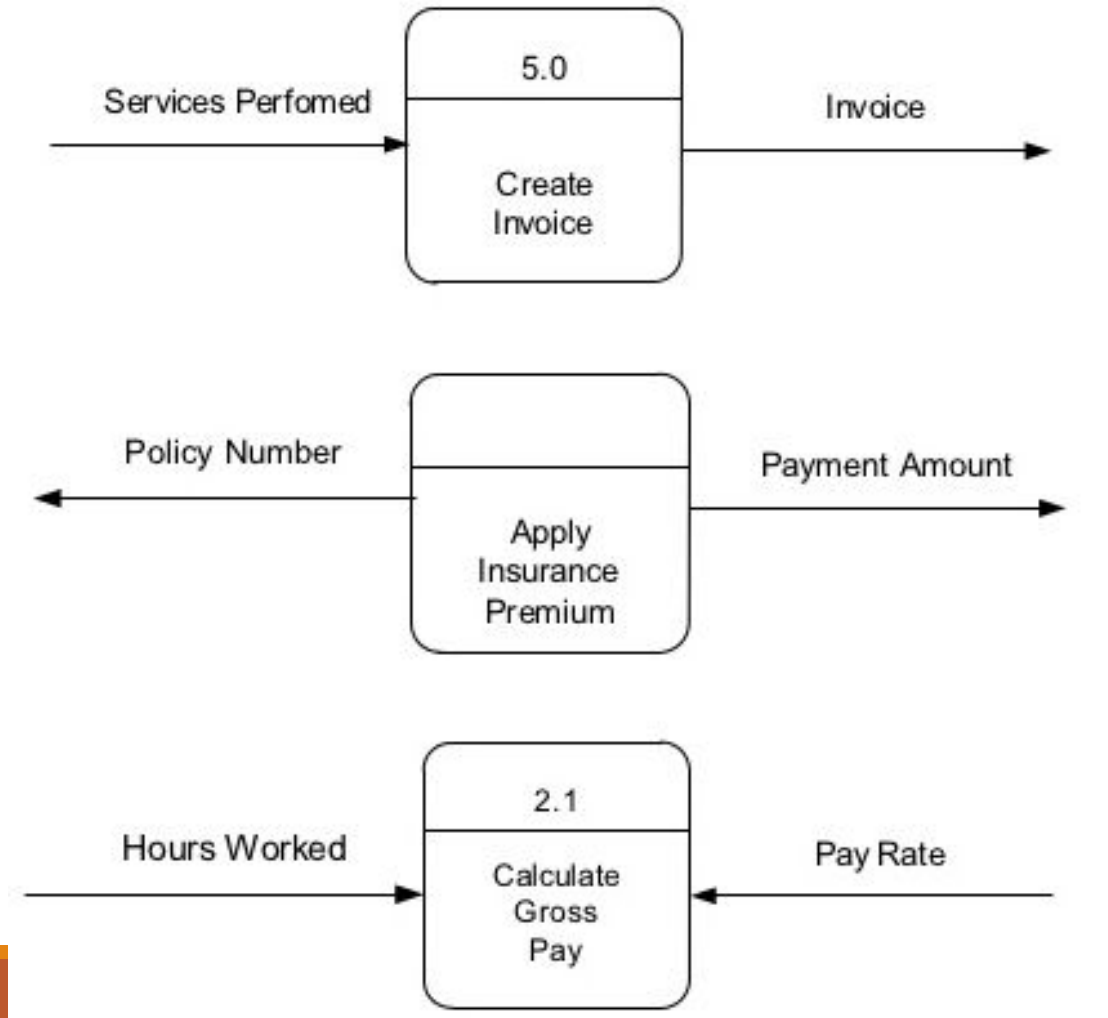
- Can have more than one outgoing data flow or more than one incoming data flow.



Process

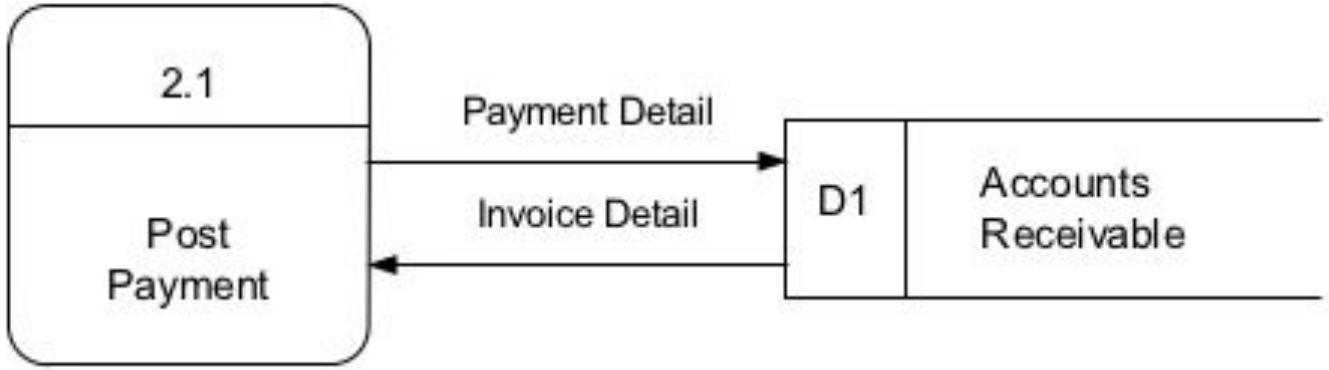
- Can connect to any other symbol (including another process symbol).

Process: correct/incorrect



Data flow

- Is a path for data move from one part of the information system to another.
- Arrows depicting movement of data.
- Can represent flow between process and data store by two separate arrows.
- Labels should be noun phrases.

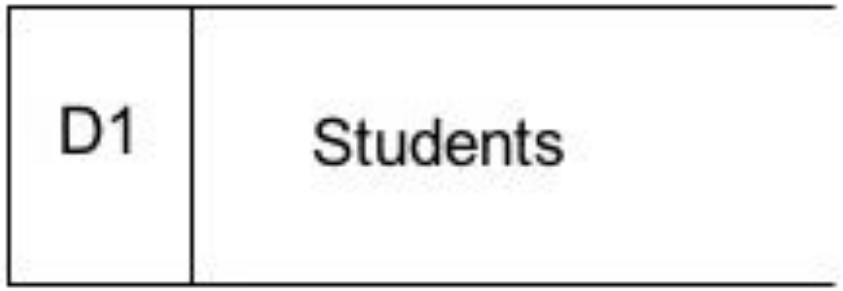


Alternative Data Flows

- Where a process can produce different data flows given different conditions.
- We show both data flows and use the process description to explain why they are alternatives.
- Tip -- alternative data flows often accompany processes with IF statements.

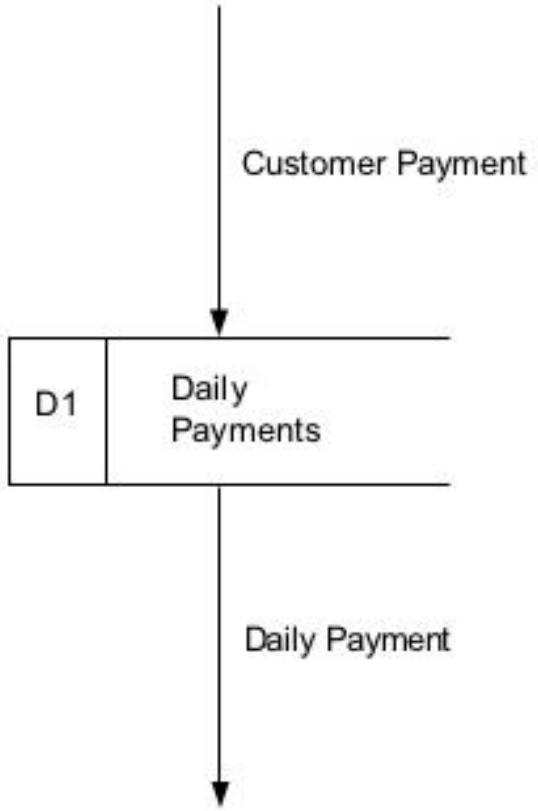
Data store

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



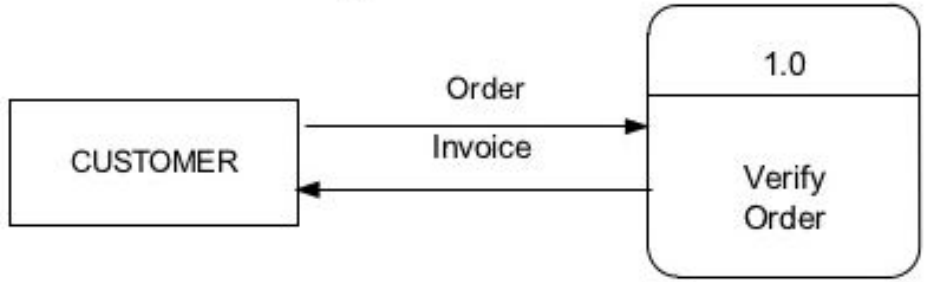
Data store

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



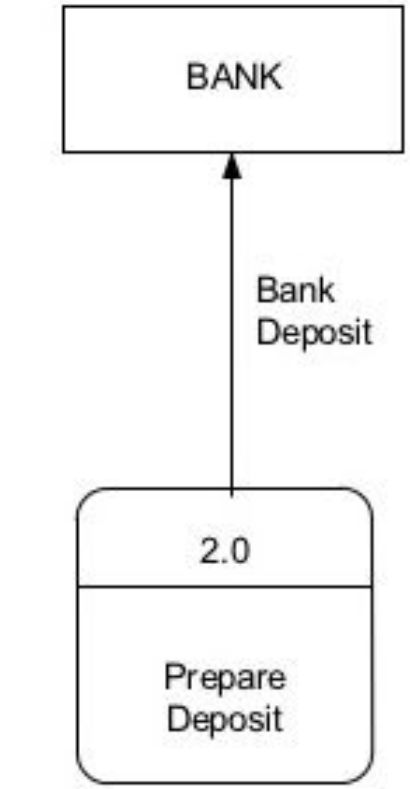
Source/Sink (external entity)

- External entity that is origin or destination of data (outside the system).
- Is the singular form of a department, outside organization, other information system, or person.
- Labels should be noun phrases.
- Source – Entity that supplies data to the system.
- Sink – Entity that receives data from the system.



Source/Sink (external entity)

- Must be connected to a process by a data flow.



Data flow that connects

	YES	NO
A process to another process	✓	
A process to an external entity	✓	
A process to a data store	✓	
An external entity to another external entity		✓
An external entity to a data store		✓
A data store to another data store		✓

Context Diagram

- First DFD in every business process.
- Shows the context into which the business process fits.
- Shows the overall business process as just one process (process 0).
- Shows all the external entities that receive information from or contribute information to the system.

Level 0 Diagram

- Shows all the major processes that comprise the overall system – the internal components of process 0.
- Shows how the major processes are interrelated by data flows.
- Shows external entities and the major processes with which they interact.
- Adds data stores.

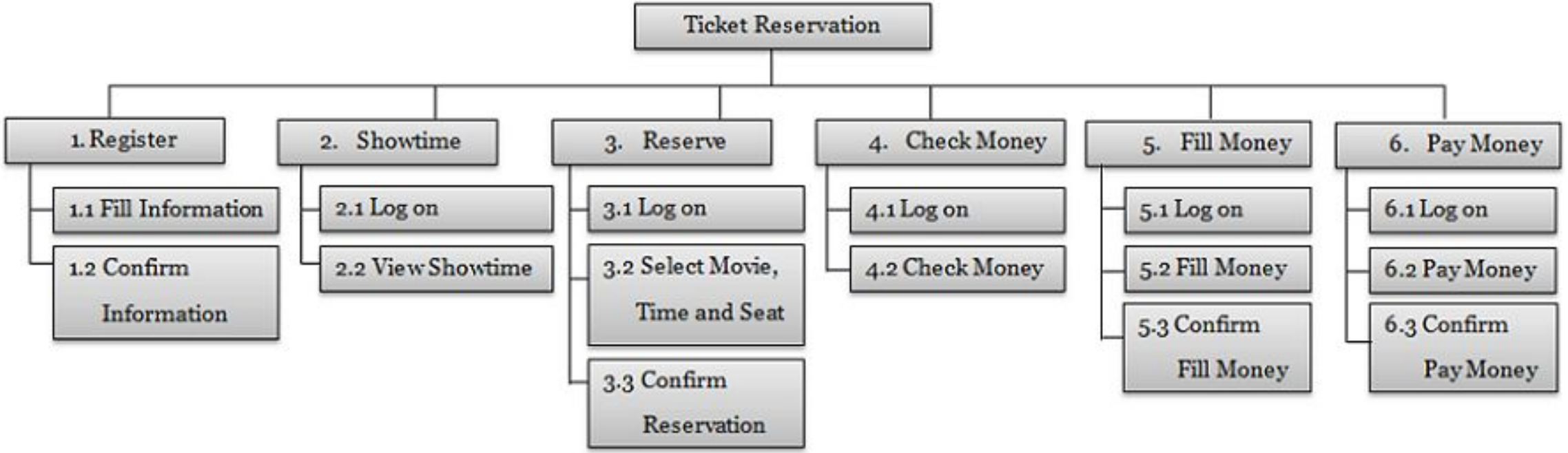
Lower-Level Diagrams

- Functional Decomposition
  - An iterative process of breaking a system description down into finer and finer detail.
  - Uses a series of increasingly detailed DFDs to describe an IS.
- Balancing
  - The conservation of inputs and outputs to a data flow process when that process is decomposed to a lower level.
  - Ensures that the input and output data flows of the parent DFD are maintained on the child DFD.

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

Functional Decomposition Diagram



Event table

Event	Trigger	Source	Activity	Response	Destination	Retrieving data store	Updating data store

Event: An event which causes the system to do something.

Trigger: A signal that tells the system that an event has occurred, either the arrival of data needing processing or a point in time.

Source: the source of an event (an actor for an EE and the system for a TIE and CIE).

Activity: Behaviour that the system performs when an event occurs.

Response:An output, produced by the system, that goes to a destination

Destination: An actor that receive the result of an event execution

Process specification

Process Specifications

- The methods available for documenting and analyzing the logic of structured decisions include structured English, decision tables, and decision trees.
- Process specifications are created for primitive processes and some higher level processes on a data flow diagram.
- They are also called minispecs.

Goal of Creating Process Specifications

- Reduce process ambiguity.
- Obtain a precise description of what is accomplished.
- Validate the system design, including data flow diagrams and the data dictionary.

Process Specification Format

- The process number, which must match the process ID on the data flow diagram.
- The process name, the same as displays within the process symbol on the DFD.
- A brief description of what the process accomplishes.
- A list of input and output data flow, using the names found on the data flow diagram.
- A description of the process logic. This should state policy and business rules, not computer language pseudocode.