Data Flow Diagram (DFD)

SEEM3430 Tutorial 3

Xingshan Zeng

Data Flow Diagram (DFD)

* A **system modeling tool**
* Focus on the processes: **Function-oriented**
* Study logical process models
  * **NOT** the physical details
    * Information is collected by paper form or web

Data Flow Diagram (DFD)

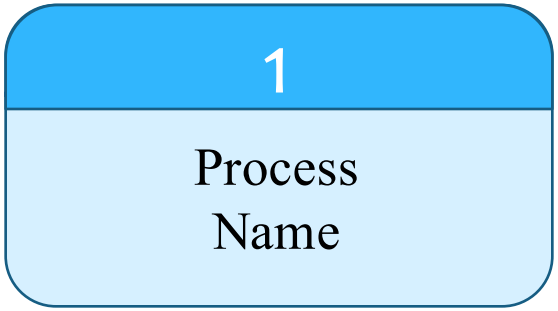
* Usually comprises of data flow, process, data storage, external entity

Data Flow

* Describe the ***movement of data*** from one part of the system to another part
* Data name
  * Information that move along the flow
  * **Only one type** of information
  * Be caution: DON'T be over detailed
    * Good: VEGETABLES
    * Bad: POTATOES, BRUSHEL SPROUTS and PEAS
  * Noun form
* Show **direction** with an arrowhead at the end of the flow

Process

* How **inputs** are transformed or changed into **outputs**
* Number
  * An index
* Process name
* Describe **what** the process does
* A **verb-object phrase**
* Example
  * Compute Sales Tax
  * Make Appointments
* At least one input (data flow)
* At least one output (data flow)



Data Store

* Exist as a necessary time-delayed storage area between two processes that occur at different times
  * as intermediate file
  * as backup mechanism
  * as testing and debugging facility
  * as an anticipation of future user needs
* Number
  * Index
* Data name
  * Noun form
  * Examples: Patients, Appointments
* One or more input data flows
* One or more output data flows

Index (e.g. D1)	Data Name

External Entity

* Can be a person, organization or system
* **Outside** the control of the system but interacts with it
* Connection should be focus on data flow
* Any other relationship that exists between terminators will **NOT** be shown in the DFD model
* Party name
  * Noun form

Guidelines for Constructing DFDs (1)

* Choose meaningful names for processes, flows, stores, and external entity
  * Avoid using "elastic" verbs like do, handle, etc.
  * Avoid using abbreviation
  * Avoid using programming-oriented terminology as "ROUTINE", "PROCEDURE" and "FUNCTION"
* Number the processes
  * Become the basis for a ***hierarchical*** numbering scheme in ***leveled*** DFDs

Guidelines for constructing DFDs (2)

* Make sure that your DFD is logically consistent
  * Avoid process that have inputs but no outputs
  * Avoid process that have outputs but no inputs
    * Except random-number generator
  * Beware of **unlabeled flows** and **unlabeled processes**
  * Beware of **read-only** or **write-only data stores**

Leveled DFDs

* Top-level DFD (Context diagram)
  * Consists of only one process, representing the entire system
  * Shows the interfaces between the system and the external entity
* Level 0
  * Immediately beneath the context diagram
  * Show the major functions and interfaces among them within the system
* Level 1 or below
  * The numbers serve as a convenient way of relating a process to the next lower level DFD

    which should be numbered for convenient reference
  * Example
    * Process A be indexed at "2" in level 0
    * Sub-process of A in level 1 should be "2.1"
  * Remind the process name is carried down to the next lower level figure

Guidelines of Leveled DFDs

* Avoid too many process and data stores
* Make sure the levels of DFDs are consistent with each other
  * The in/out dataflow of a process at one level must be corresponded to the in/out dataflow of an entire figure at the next lower level
* Show a data store repeat at different levels
* Add description or footnotes if necessary

What DFDs Do Not Do

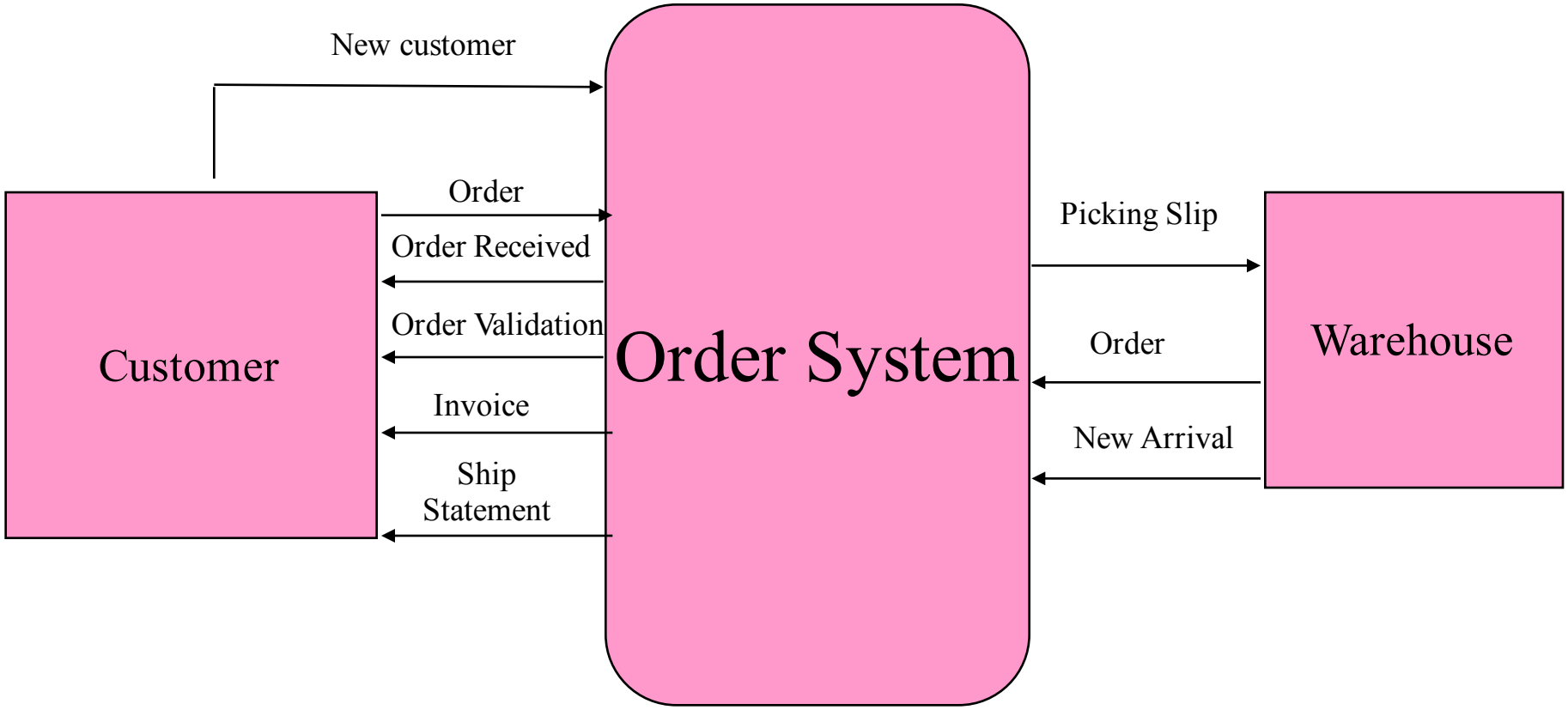
* **DFDs Do Not Handle Sequence**
  * DFDs are drawn by considering a sequence of actions
  * Does not mean that we can infer sequentially from a DFD
* **DFDs Do Not Handle Priorities**
  * If two processes want to read from the same file at the same time, which one wins?
  * DFDs do not address the problem
* **DFDs Do Not Define the Structure of the Data**

Some Other Mistakes in DFDs

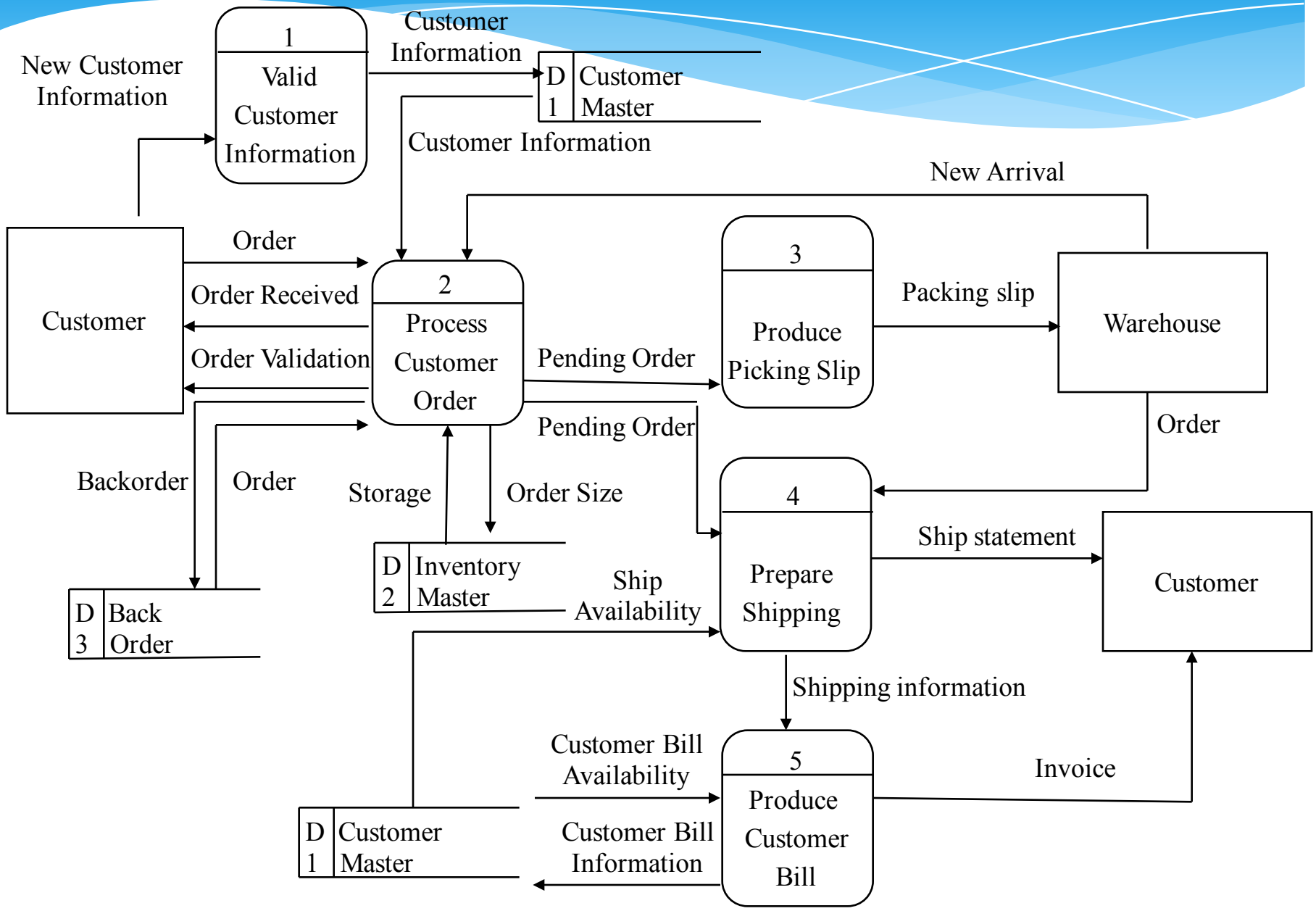
* Data Flow Errors
  * A data flow cannot be two-headed arrows
  * A data flow cannot go directly back to same process it leaves
* Connection errors
  * Data cannot move from/to an external entity without any process
  * Data cannot move from a data store to another data store without any process

Data Flow Diagram (DFD) Example

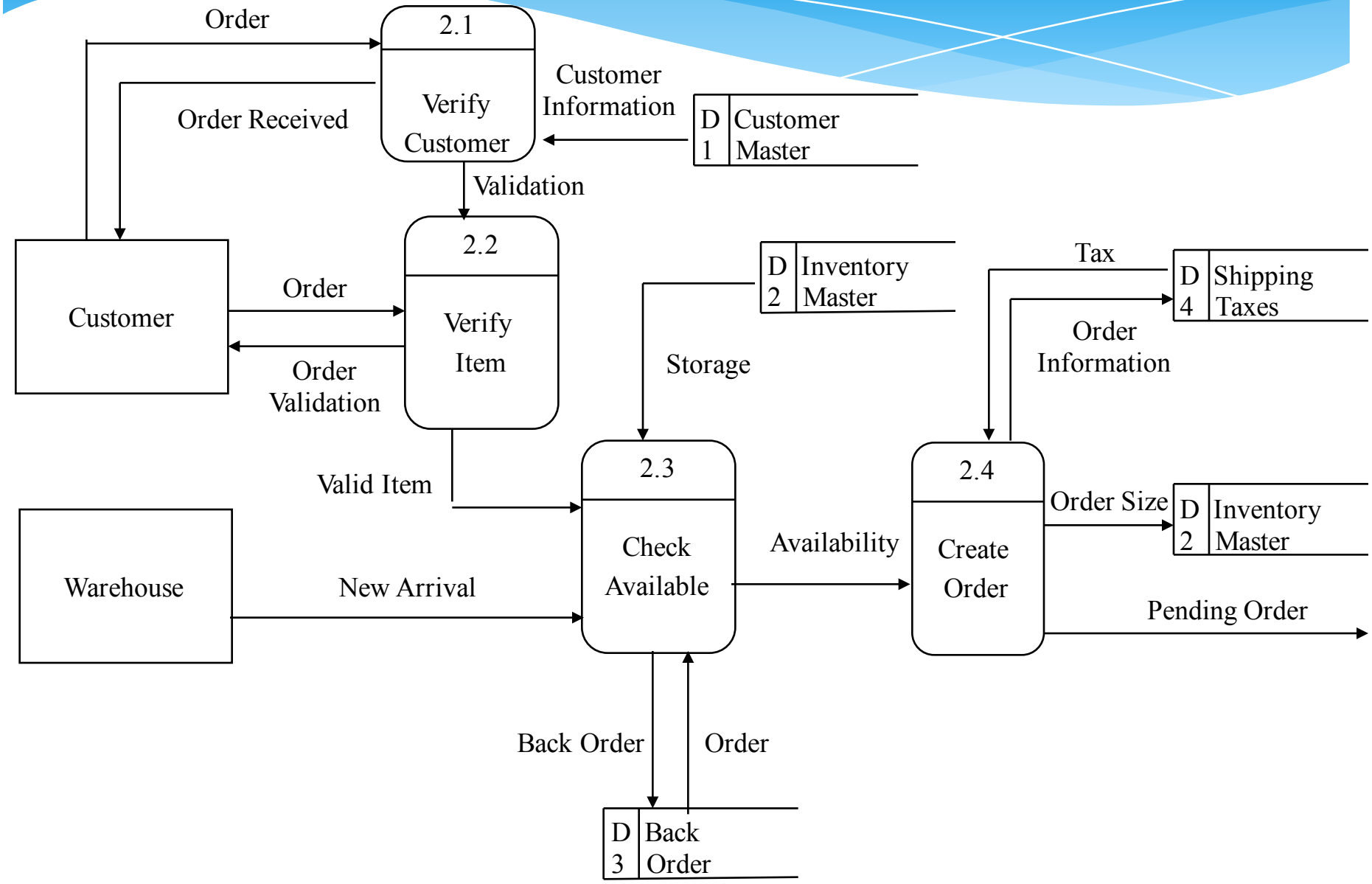
Context Diagram



Level 0


1
Valid Customer Information
New Customer Information
Customer Information
D 1 Customer Master
Customer Information
New Arrival
Customer
Order
Order Received
Order Validation
2
Process Customer Order
3
Produce Picking Slip
Packing slip
Warehouse
Pending Order
Pending Order
Order
Backorder
Order
Storage
Order Size
4
Prepare Shipping
Ship statement
Customer
D 2 Inventory Master
Ship Availability
D 3 Back Order
Shipping information
Customer Bill Availability
5
Produce Customer Bill
Invoice
D 1 Customer Master
Customer Bill Information

Level 1


Order
2.1
Verify Customer
Customer Information
D 1 Customer Master
Order Received
Validation
2.2
Customer
Order
Verify Item
Order Validation
D 2 Inventory Master
Storage
Tax
D 4 Shipping Taxes
Order Information
Valid Item
2.3
Check Available
2.4
Create Order
Order Size
D 2 Inventory Master
Warehouse
New Arrival
Availability
Pending Order
Back Order
Order
D 3 Back Order