Accounting Information Systems

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Lecture 3

Documenting Transaction Cycles: Data Flow Diagrams; System Flow charts

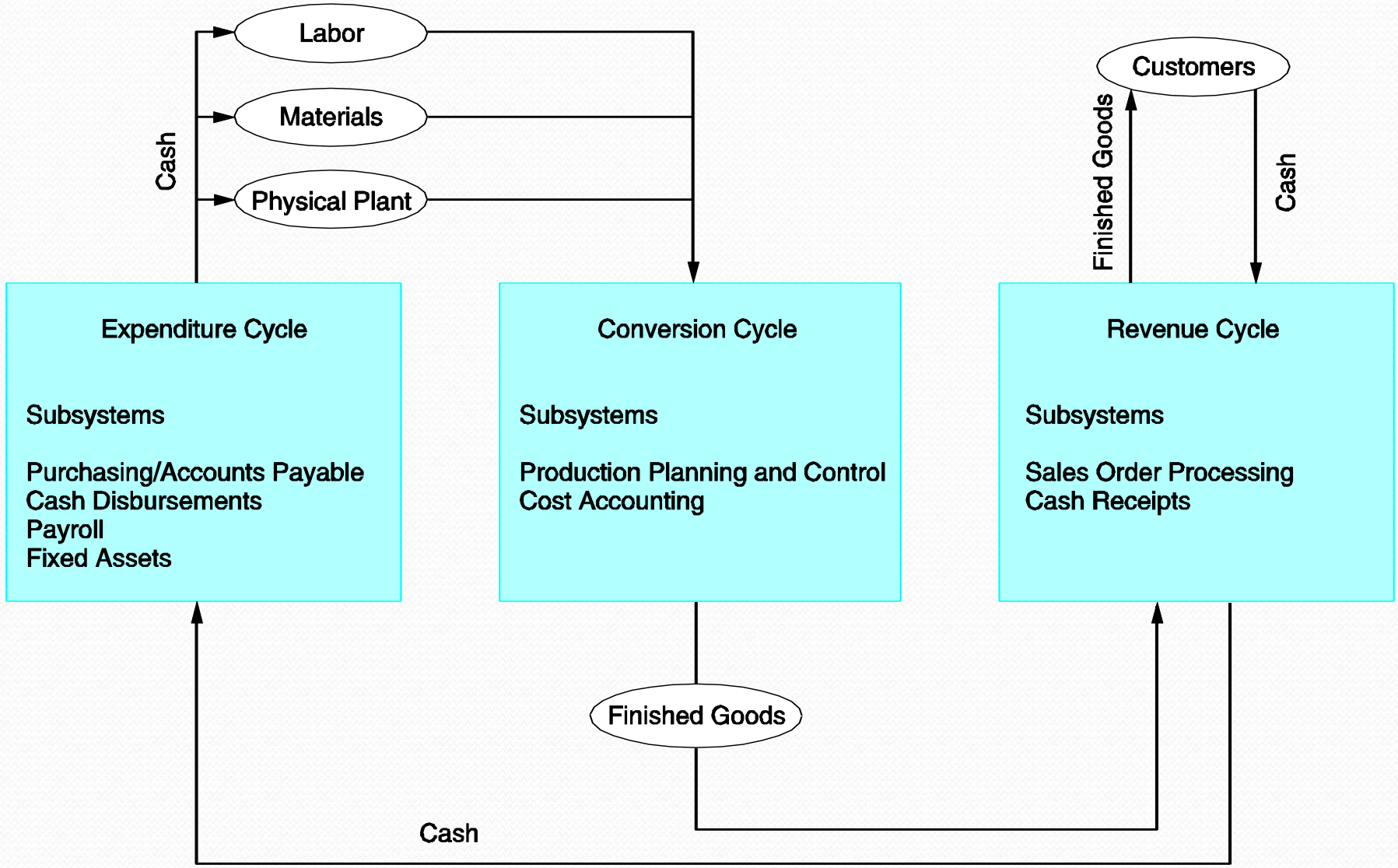
Objectives for Lecture 3

- Broad objectives of transaction cycles
- Types of transactions processed by each of the three transaction cycles
- The basic accounting records used in TPS
- The traditional accounting records and their magnetic equivalents
- Documentation techniques
- Batch and real-time processing and the impact of these technologies on transaction processing

A Financial Transaction is...

- an economic event that affects the assets and equities of the firm, is reflected in its accounts, and is measured in monetary terms.
- similar types of transactions are grouped together into **three transaction cycles:**
  - the expenditure cycle,
  - the conversion cycle, and
  - the revenue cycle.

Relationship between Transaction Cycles



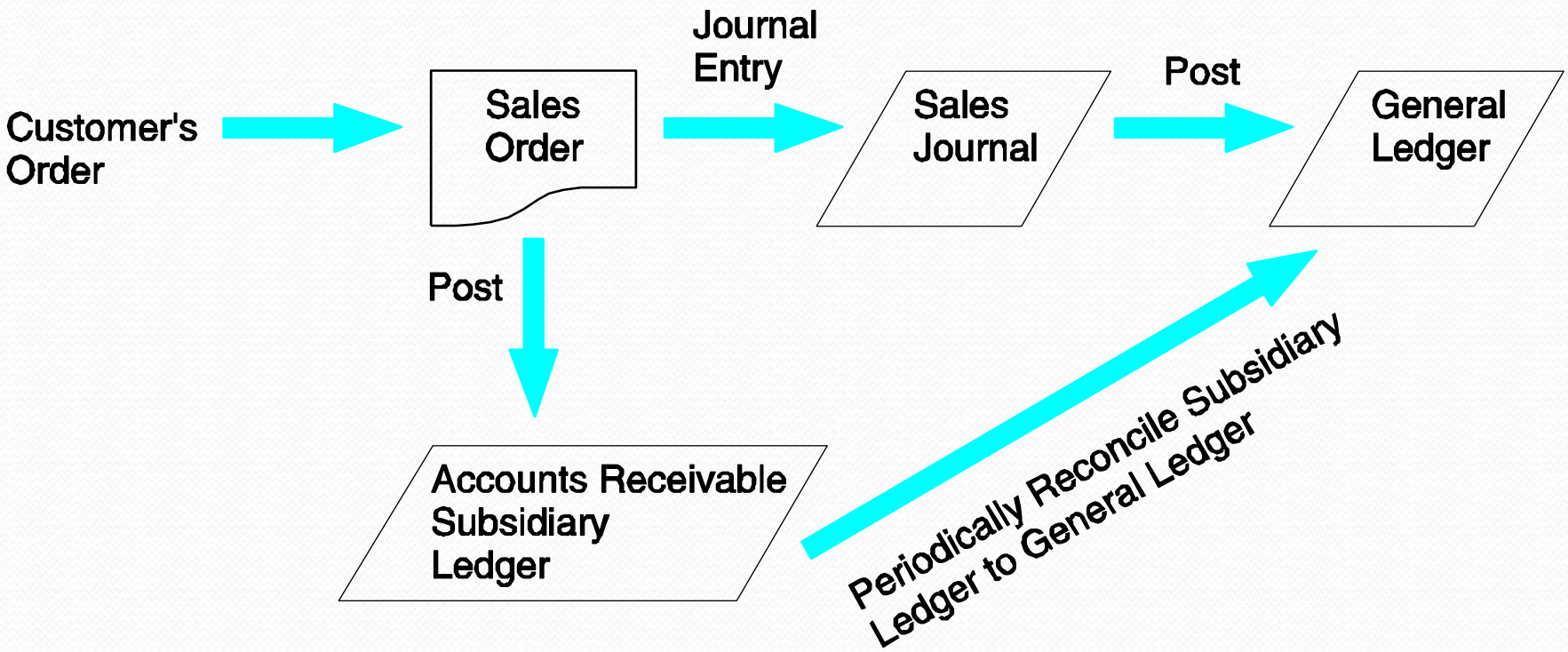
Each Cycle has Two Subsystems

- Expenditure Cycle: time lag between the two subsystems due to credit relations with suppliers:
  - **physical component** (acquisition of goods)
  - **financial component** (cash disbursements to the supplier)
- Conversion Cycle :
  - **the production system** (planning, scheduling, and control of the physical product through the manufacturing process)
  - **the cost accounting system** (monitors the flow of cost information related to production)
- Revenue Cycle: time lag between the two subsystems due to credit relations with customers :
  - **physical component** (sales order processing)
  - **financial component** (cash receipts)

Manual System Accounting Records

- **Source Documents** - used to capture and formalize transaction data needed for transaction processing
- **Product Documents** - the result of transaction processing
- **Turnaround Documents** - a product document of one system that becomes a source document for another system
- **Journals** - a record of chronological entry
  - **special journals** - specific classes of transactions that occur in high frequency
  - **general journal** - nonrecurring, infrequent, and dissimilar transactions
- **Ledger** - a book of financial accounts
  - **general ledger** - shows activity for each account listed on the chart of accounts
  - **subsidiary ledger** - shows activity by detail for each account type

Flow of Economic Events Into the General Ledger



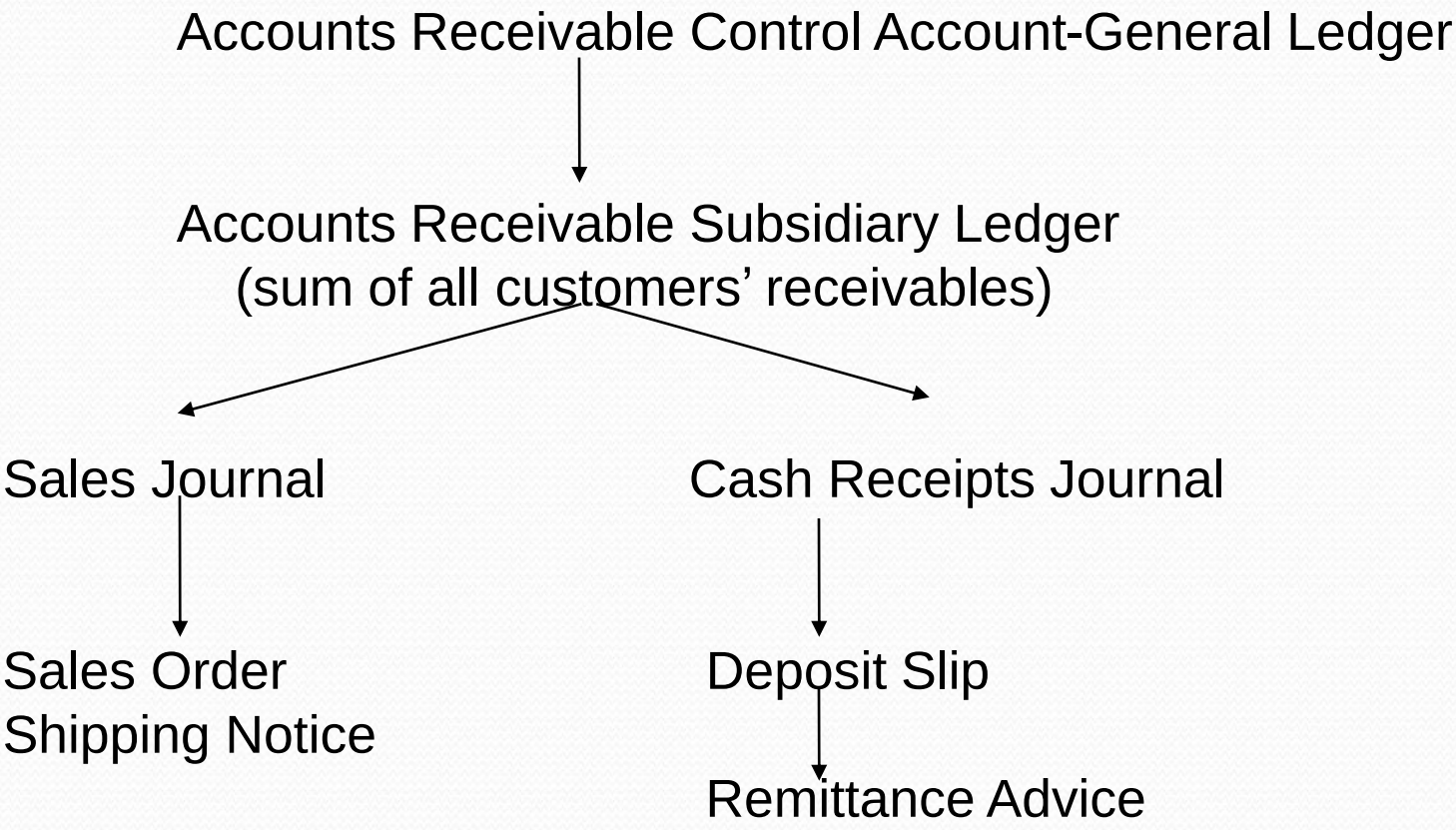
Computer Files

- **Master File** - generally contains account data (e.g., general ledger and subsidiary file) - mostly change existing fields
- **Transaction File** - a temporary file containing transactions since the last update – mostly add new records
- Accounts Receivable (AR) file: Add record for new credit sale; adjust balance owing when money paid → Qn: What type of file is the AR file?
- **Reference File** - contains relatively constant information used in processing (e.g., tax tables, standard costs)
- **Archive File** - contains past transactions for reference purposes

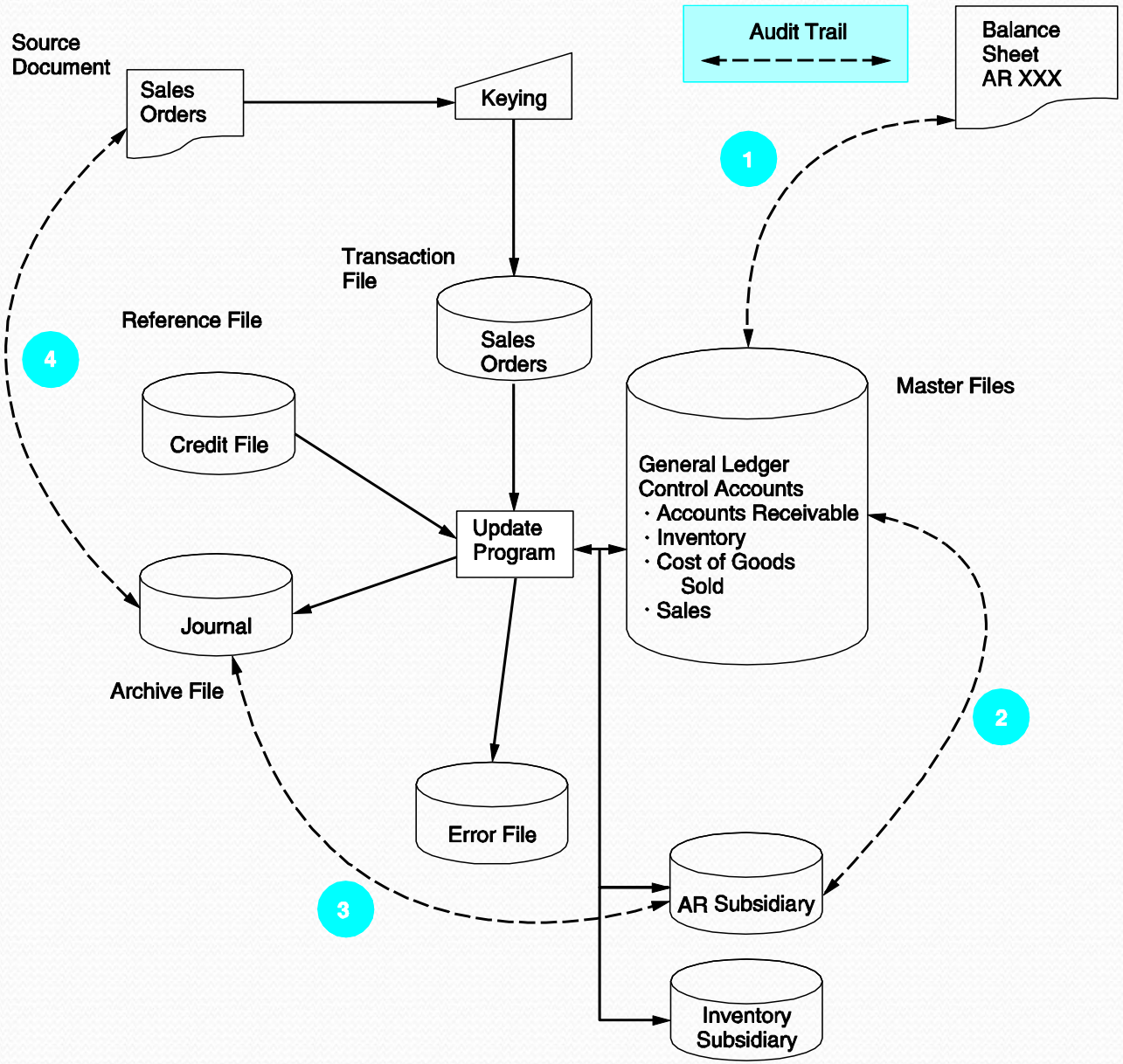
Computer-Based Systems

- The *audit trail is less observable* in computer-based systems than traditional manual systems.
- The data entry and computer programs are the physical trail.
- The data are stored in magnetic files.

How would we verify the Accounts Receivable balance?



Accounting Records in a Computer-Based System



EXPLANATION OF STEPS IN FIGURE:

1. Compare the AR balance in the balance sheet with the master file AR control account balance.
2. Reconcile the AR control figure with the AR subsidiary account total.
3. Select a sample of update entries made to accounts in the AR subsidiary ledger and trace these to transactions in the sales journal (archive file).
4. From these journal entries, identify source documents that can be pulled from their files and verified. If necessary, confirm these source documents by contacting the customers.

Documentation Techniques

- Documentation in a Computer Based environment is necessary for many reasons.
- Five common documentation techniques:
  - Entity Relationship Diagram/REA model
  - Data Flow Diagrams
  - Document Flowcharts
  - System Flowcharts
  - Program Flowcharts

Entity Relationship Diagram (ERD)…

- Is a documentation technique to represent the relationship between entities in a system.
- The REA model version of ERD is widely used in AIS. REA uses 3 types of entities:
  - **resources** (cash, raw materials)
  - **events** (release of raw materials into the production process)
  - **agents** (inventory control clerk, vendor, production worker)

Types of Events in REA

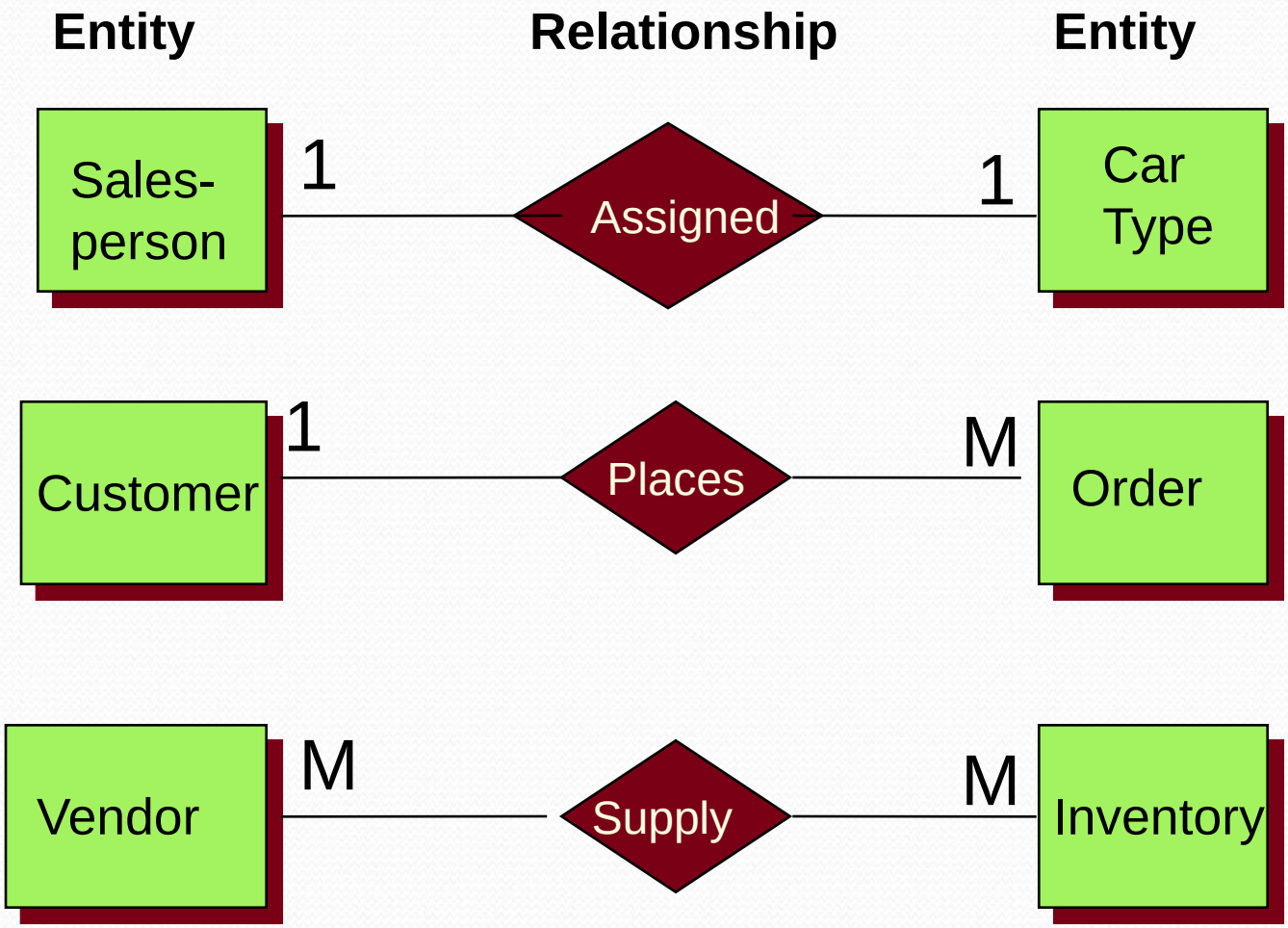
- **Operational events**[day to day activities of an event such as buying and selling]
- **Informational events**[events used to add knowledge about a given process e.g how to improve sales]
- **Decision Support events**[events relevant for strategic planning e.g financial statements]

*REA focuses on operational events ONLY

Steps in REA modelling

- Identify the Events
- Identify the sequence of these events
- Identify the resources required by these events
- Determine the links/mapping between these events[mapping between events and resources]
- Identify the associations between the events themselves

Cardinalities



Cardinalities…

- Are part of the description of the relationship between entities in an ER diagram.
- They represents the numerical mapping between entities:
  - one-to-one
  - one-to-many
  - Many-to-many
- Entities map to database tables in a relational database. Also, extra tables exist for relationships in many-to-many relationships.
- e.g. Unversity database might have tables → students, courses, and courses taken by students

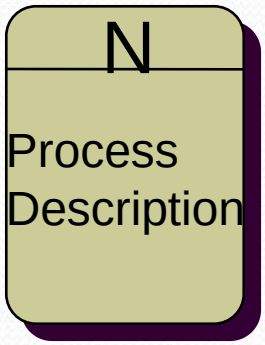
Data Flow Diagrams (DFD)…

- use symbols to represent the processes, data sources, data flows, and entities in a system
- Why? These diagrams clarify the information flows through the AIS. Also shows how different elements of the system relate to each other.
- We need this documentation to get a complete picture of the system
- Nb. Slightly different symbols are used in different texts – the next slide shows the symbols used in the Hall text
- DFD's in Hall are logical information flows through the firm, but do not represent the actual flows of goods.
- Other texts also discuss physical DFDs (see Gelinas "handout" on website)

Data Flow Diagrams (DFD)…

- **What is the relationship between ER diagrams and DFDs?**
- A DFD is a model of a systems processes while and ER diagram models the data used in the system as depicted in the DFD.
- eg. figure 2-13 shows a DFD for the sales order processing system while figure 2-15 shows one view of its ER model.
- In this course we will be using the REA data model as the ER diagram as it provides more information than a traditional ER model.
- eg. REA models the exchange process – I give you money when you give me goods.

Data Flow Diagram Symbols



Direction of data flow

Context Diagrams, Physical DFDs and Logical DFDs

- Consider the Gelinas document on the website. 3 Different types of diagrams:-
  - Context diagram
  - Physical DFD
  - Logical DFD
- Context diagram is top level. It depicts the links between the system of interest and its suroundings.
- Only one "bubble" (internal entity) and many external entities.
- Note: no links between external entities; goods are NOT data UNLESS they carry documents such as bill of lading etc.

Context Diagrams, Physical DFDs and Logical DFDs

- Physical DFD explodes context diagram into different levels. It shows who is doing what in the system.
- There are different levels of DFDs – level 0, 1, 2, etc
- More aggregated information at lower levels.
- Consists of information processing activities (entities) which:-
  - transform data
  - retrieve data from storage
  - file date
- The sending and receiving of data between entities are not information processing activities because no data is transformed.

Context Diagrams, Physical DFDs and Logical DFDs

- The internal entities are names of things (people, departments, etc) that transform data (e.g cashier).
- (Internal entities in logical DFDs are verbs (eg. capture cash receipts)).
- The external entities in physical (and logical) DFD should be exactly the same as for context diagram.
- Logical DFD is similar to physical except that internal entities are logical actions → same rules apply to these as for physical DFDs.
- Physical DFDs show system as it is implemented, while logical DFD shows the logical functions independent of the way they are implemented

Context Diagrams, Physical DFDs and Logical DFDs

- Thus, physical DFD may show mailroom collecting cash receipts from customers by mail, the logical DFD would show a "capture cash receipts" function – see Gelinas fig 3.11 & 3.12.
- This "capture cash receipts" function could be implemented a number of ways other than using a mailroom (eg. electronic receipt of cash through EDI).
- Make sure DFDs are balanced → same external entities and data stores.
- Lets work through an example – see Causway Cash receipts system – Gelinas pp.80-89

Documents Flowcharts…

- Illustrate the relationship among processes and the documents that flow between them
- contain more details than data flow diagrams
- clearly depict the separation of functions in a system

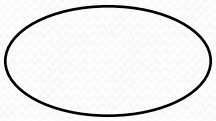
Try an example:-

- 1. A clerk in the sales department receives customer orders by mail and prepares four copies of the sales order.
- 2. Copy 1 of the sales order is sent to the credit department for approval. The other 3 copies and the original customer order are filed temporarily pending credit approval.

Documents Flowcharts…

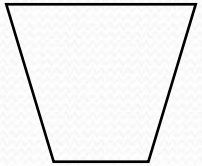
- 3. The credit department clerk validates the customer order against the credit records kept in the credit department. The clerk signs copy 1 to signify approval and returns it to the sales clerk.
- 4. When the sales clerk receives credit approval, they file copy1 and the customer order in the department. The clerk sends copy 2 to the warehouse and copies 3 & 4 to the shipping department.
- 5. The warehouse clerk picks the products from the shelves, records the transfer in the stock records, and sends the products and copy 2 to the shipping department.

Symbol Set for Document Flowcharts

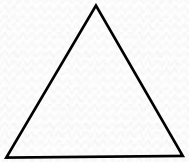


Terminal showing source or destination of documents and reports

Source document or report

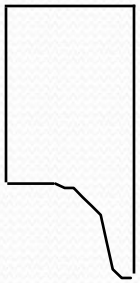


Manual operation

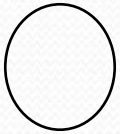


File for storing source documents and reports

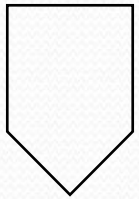
Accounting records (journals, registers, logs, ledgers)



Calculated batch total



On-page connector

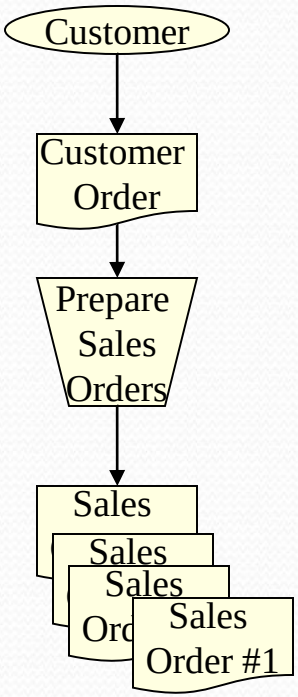


Off-page connector

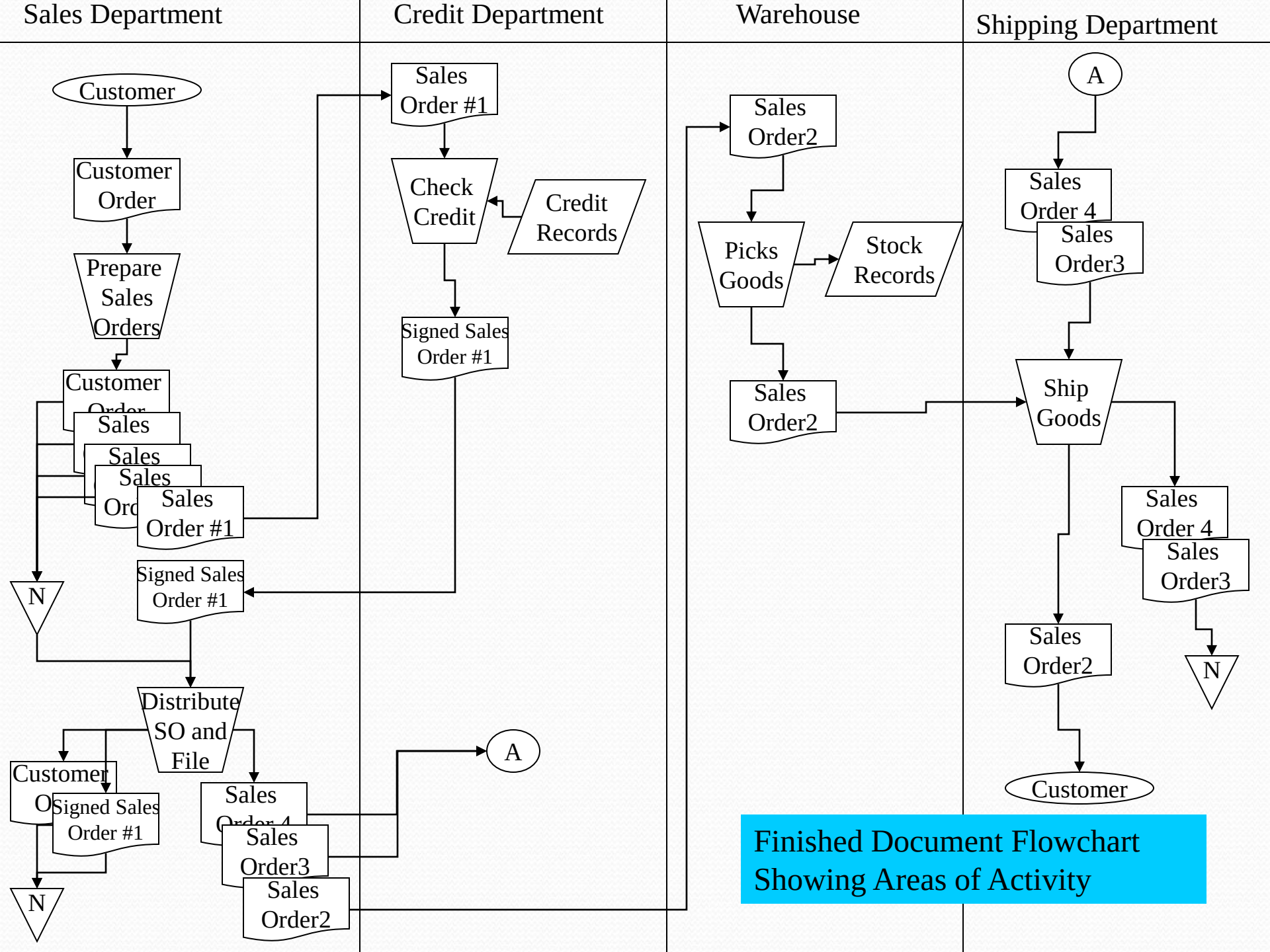
Description of process or comments

Document flowline

Sales Department	Credit Department	Warehouse	Shipping Department



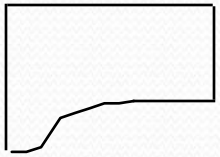
First Stages in Constructing Document Flowchart Showing Areas of Activity


Sales Department
Credit Department
Warehouse
Shipping Department
Customer
Customer Order
Prepare Sales Orders
Sales Order #1
Sales Order #1
Check Credit
Credit Records
Signed Sales Order #1
Signed Sales Order #1
N
Distribute SO and File
Signed Sales Order #1
N
A
Sales Order2
Picks Goods
Stock Records
Sales Order2
A
Sales Order 4
Sales Order3
Ship Goods
Sales Order 4
Sales Order3
Sales Order2
N
Customer
Finished Document Flowchart
Showing Areas of Activity

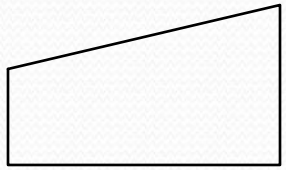
System Flowcharts…

- Are used to represent the relationship between the key elements - input sources, programs, and output products - of computer systems
- Depict the type of media being used (paper, magnetic tape, magnetic disks, and terminals)
- In practice, not much difference between document and system flowcharts

Systems Flowchart Symbols



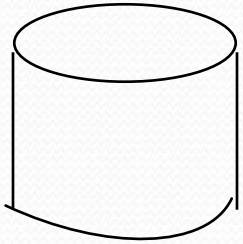
Hard copy



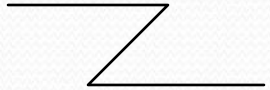
Terminal input/ output device

Computer process

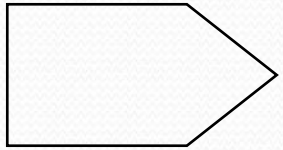
Process flow



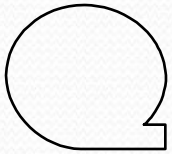
Direct access storage device



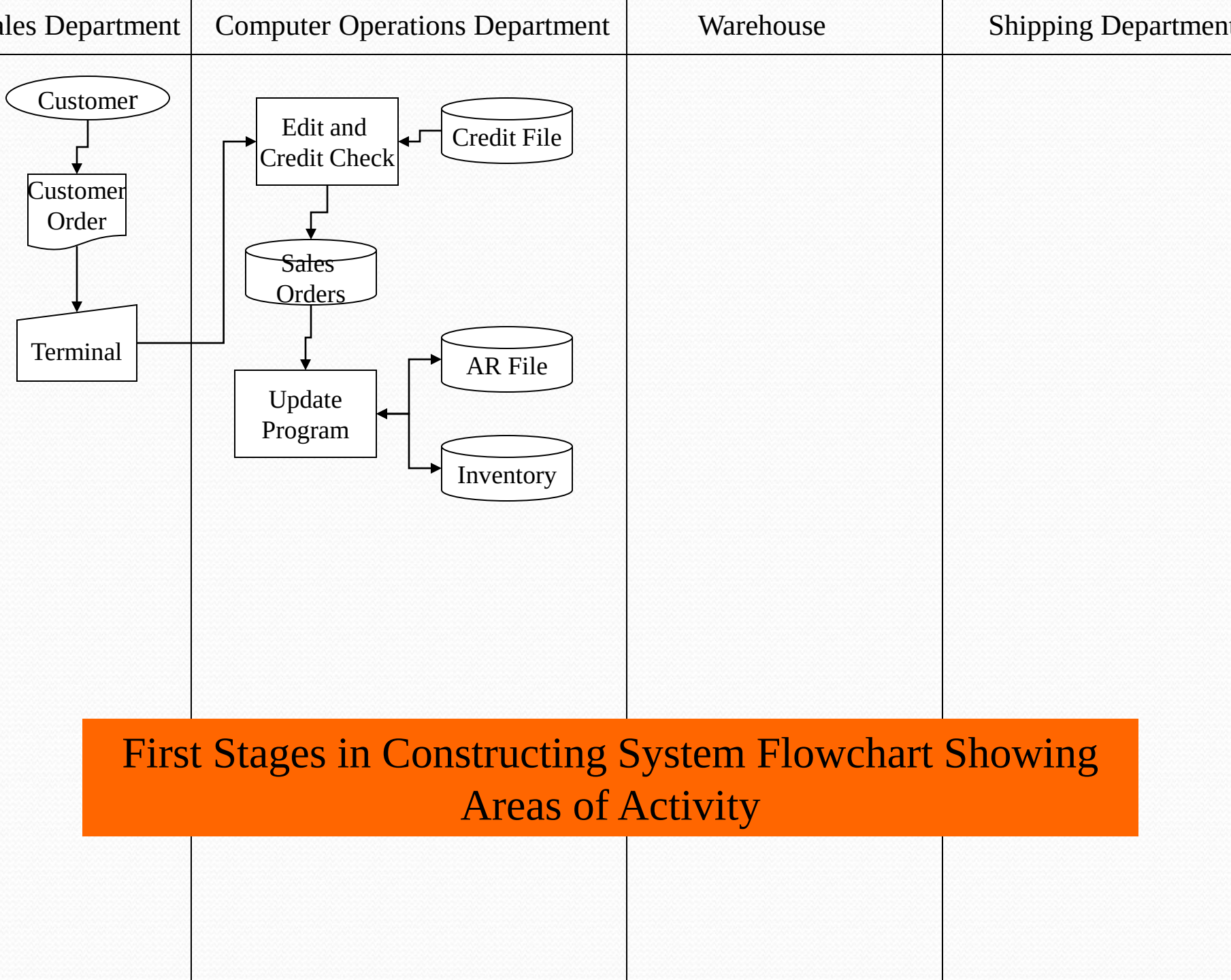
Real-time (online) connection



Video display device



Magnetic tape



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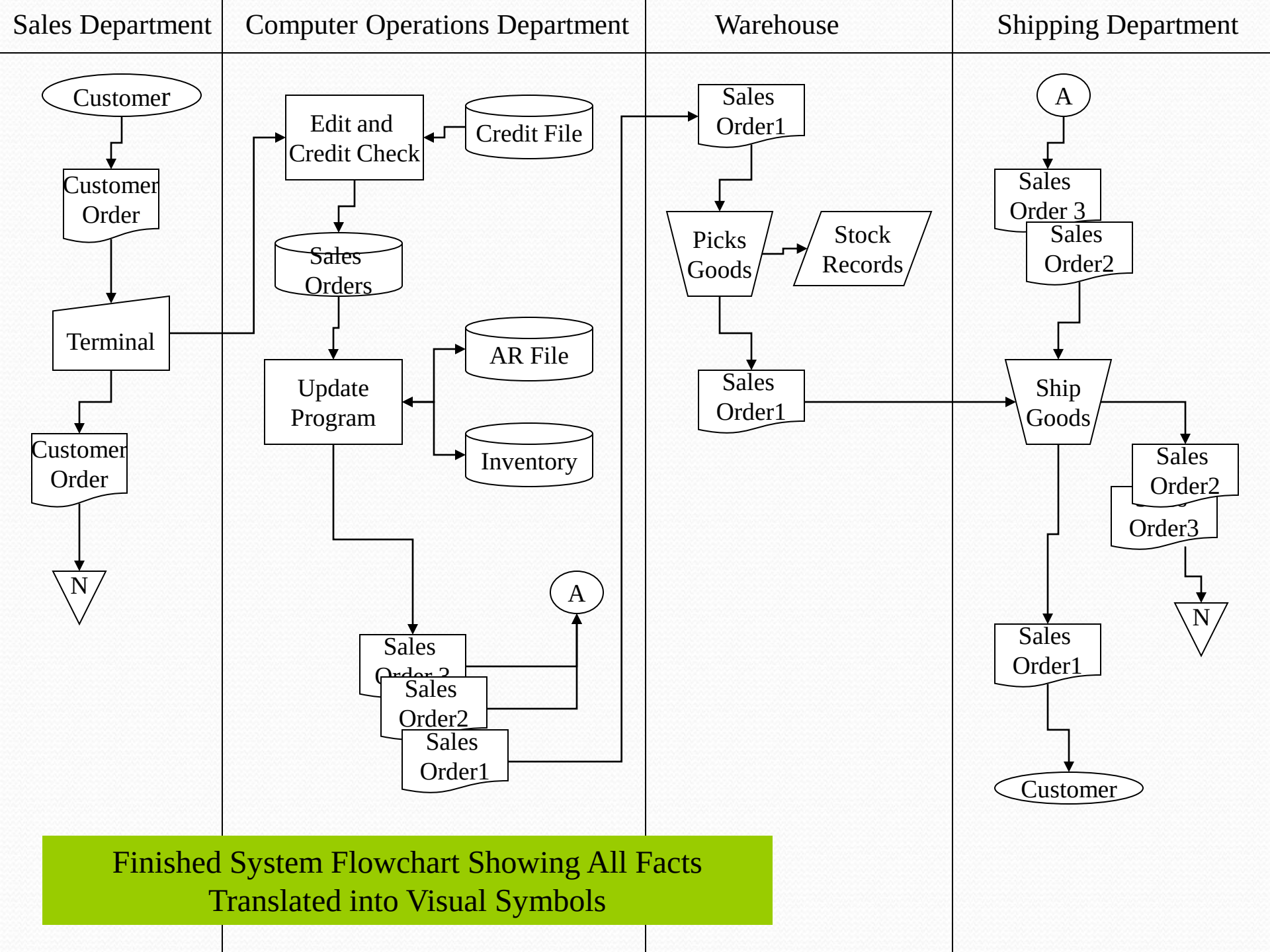
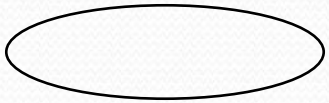


Finished System Flowchart Showing All Facts Translated into Visual Symbols

Program Flowcharts…

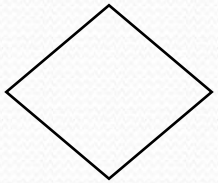
illustrate the logic used in programs
Program Flowchart Symbols

Logical process



Terminal start or end operation

Input/output operation



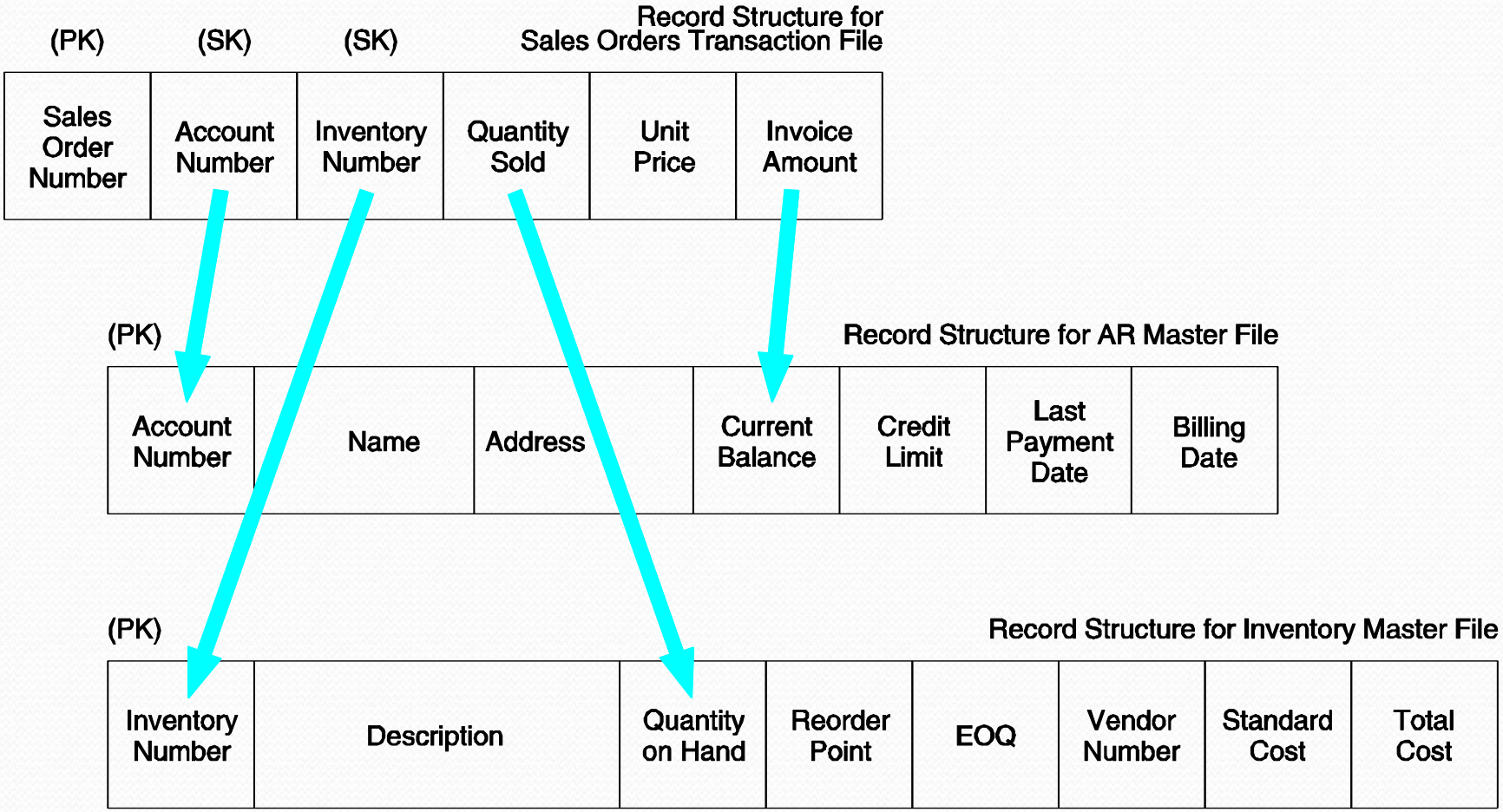
Decision

Flow of logical process

Modern Systems versus Legacy Systems

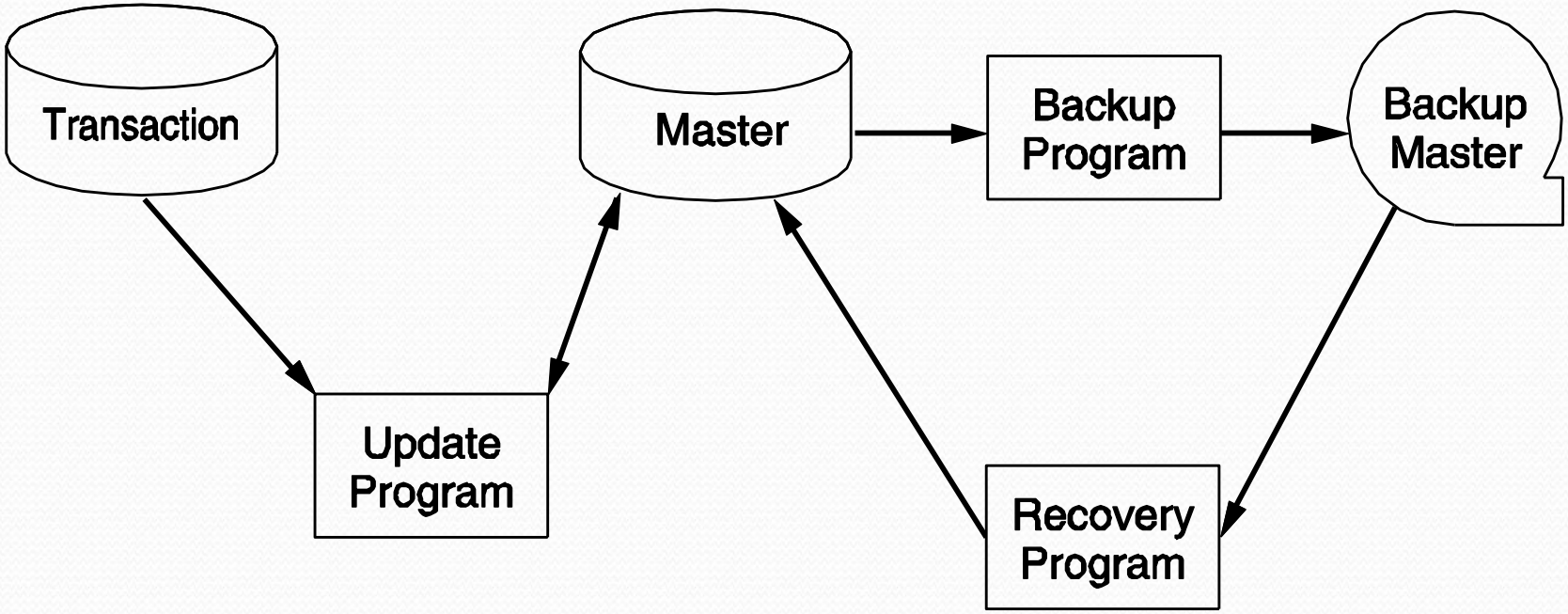
- Modern systems characteristics:
  - client-server based and process transactions in real time
  - use relational database tables
  - have high degree of process integration and data sharing
  - some are mainframe based and use batch processing
- Some firms employ legacy systems for certain aspects of their data processing.
  - Accountants need to understand legacy systems.
- Legacy systems characteristics:
  - mainframe-based applications
  - batch oriented
  - early legacy systems use flat files for data storage
  - later legacy systems use hierarchical and network databases
  - data storage systems promote a single-user environment that discourages information integration

Updating Master Files: Primary Keys (PK) and Secondary Keys (SK)



Database Backup Procedures

- Destructive updates leave no backup.
- To preserve adequate records, backup procedures must be implemented, as shown below:
  - The master file being updated is copied as a backup.
  - A recovery program uses the backup to create a pre-update version of the master file.



Computer-Based Accounting Systems

- Two broad classes of systems:
  - batch systems
  - real-time systems

Batch Processing

- A **batch** is a group of similar transactions that are accumulated over time and then processed together.
- The transactions *must be independent of one another during the time period over which the transactions are accumulated* in order for batch processing to be appropriate.
- A *time lag exists* between the event and the processing.

Advantages of Batch Processing

- Organizations can **increase efficiency** by grouping large numbers of transactions into batches rather than processing each event separately.
- Batch processing **provides control** over the transaction process via control figures.

Real-Time Systems…

- **Process transactions individually** at the moment the economic event occurs
- Have **no time lag** between the economic event and the processing
- Generally **require greater resources** than batch processing since they require dedicated processing capacity; however, these cost differentials are decreasing
- Oftentimes have **longer systems development time**

Batch vs Real-Time Systems

Characteristic Differences between Batch and Real-Time Processing

DISTINGUISHING CHARACTERISTIC	DATA PROCESSING METHODS	
	Batch	**Real-Time**
Information Time Frame	Lag exists between time when the economic event occurs and when it is recorded.	Processing takes place when the economic event occurs.
Resources	Generally, fewer resources (hardware, programming, training) are required.	More resources are required than for batch processing.
Operational Efficiency	Certain records are processed after the event to avoid operational delays.	All records pertaining to the event are processed immediately.

Why Do So Many AIS Use Batch Processing?

- AIS processing is characterized by high-volume, independent transactions, such are recording cash receipts cheques received in the mail.
- The processing of such high-volume cheques can be done during an off-peak computer time.
- This is one reason why batch processing maybe done using real-time data collection.