INFORMATION SYSTEMS ANALYSIS AND DESIGN

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Documenting Information Systems

- Introduction
- Why Documentation Is Important
- Document and Systems Flowcharts
- Process Maps and Data Flow diagrams

Documenting Information Systems

- Other documentation tools
- End-user Computing And Documentation
- Summary

Documentation of Systems

- Documentation is a vital part of any IS.
- Used to trace the flow of data through an IS.
- A wide variety of software is available for documenting ISs.

Why Documentation Is Important

- Depicting how the system works
- Training users
- Designing new systems
- Controlling system development and maintenance costs
- Standardizing communications with others

Why Documentation Is Important

- Auditing ISs
- Documenting business processes
- Complying with the Sarbanes Oxley Act of 2002
- Establishing accountability

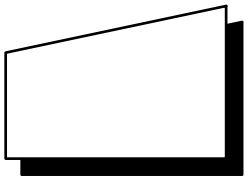
Types of Flowcharts

- **Document Flowcharts - Document flowchart traces the physical flow of documents through an organization.**
- **Systems Flowcharts System flowcharts depict the electronic flow of data and processing steps in an IS.**

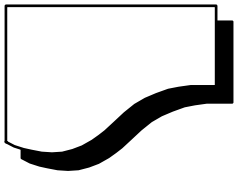
Document Flowcharts

- Constructing a document flowchart begins by identifying the different departments or groups that handle the documents of a particular system.
- Auditors and accountants may use document flowcharts when analyzing a current system for weaknesses in controls and reports.

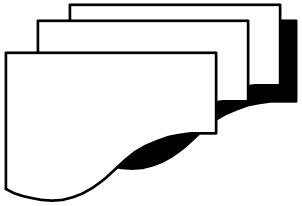
Common Document Flowcharting Symbols



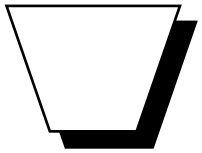
Keying operation



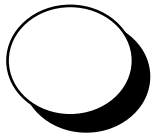
Document



Multiple copies of a specific document



Manual Operation

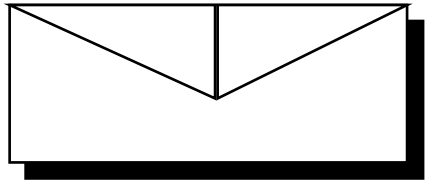


Connector between two points on a flowchart

Journal or ledger

Common Document Flowcharting Symbols

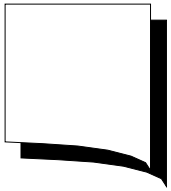
Permanent file of manual documents



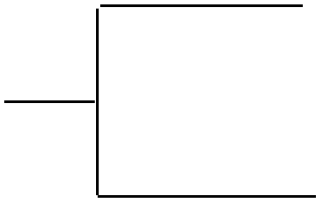
Envelope for mailing or distributing bills or checks, etc.

Information flow

Document flow

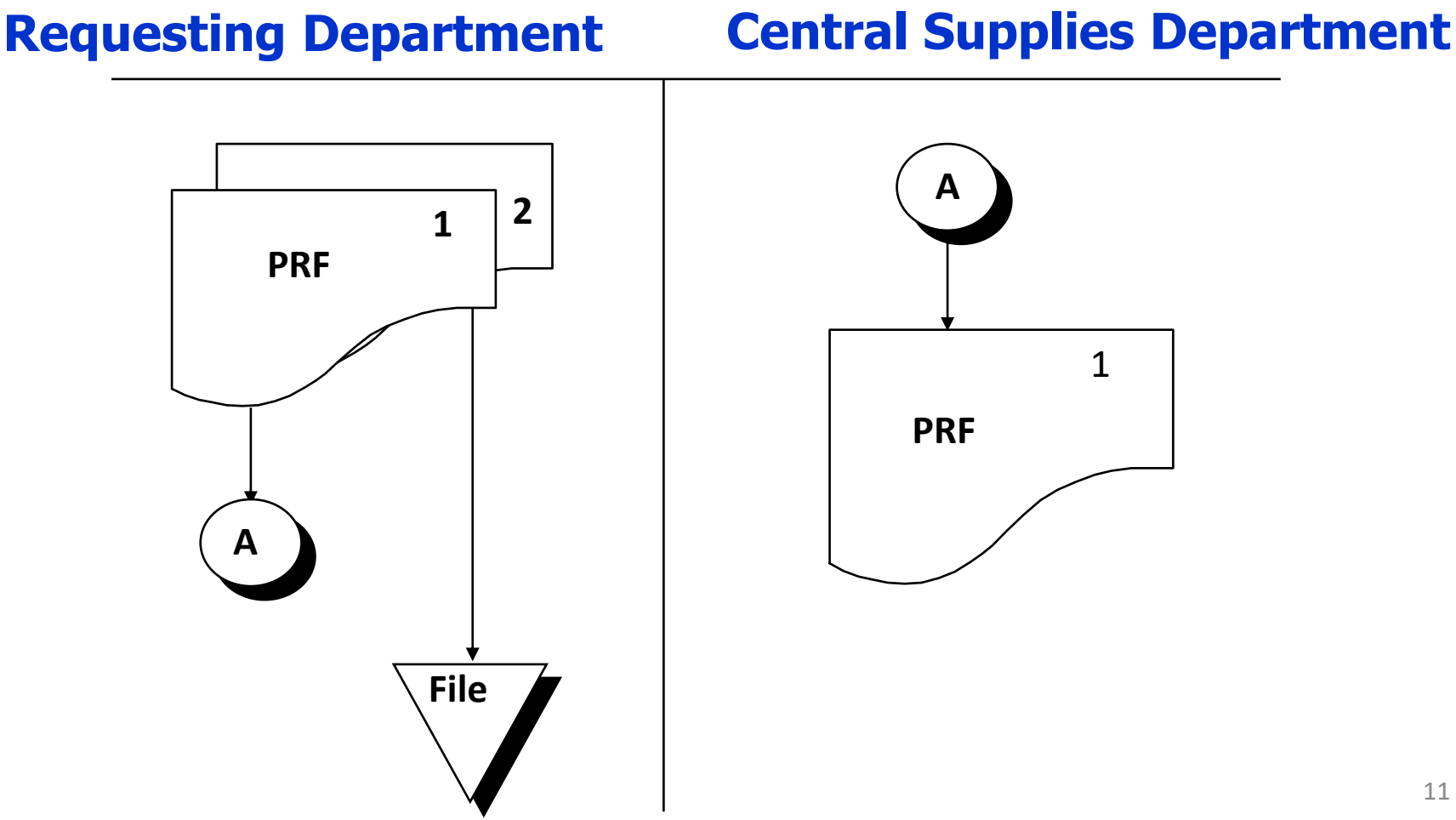


Adding machine tape used for batch control



Annotation for additional explanation

A Sample Document Flowchart



Document Flowcharting Guidelines

- Identify all departments involved
- Classify activities department-wise.
- Identify documents by numbers or color-coding.
- Account for the distribution of every copy of a document.

Document Flowcharting Guidelines

- Use on-page and off-page connectors and connect by using same letter or number.
- Annotate document for clarity.
- Consider sequencing whenever important.
- Avoid acronyms to avoid confusion.
- Consider using automated flowchart tools.

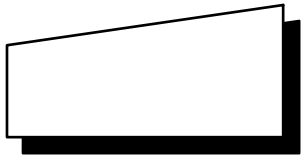
System Flowcharts

- They use symbols that are industry conventions standardized by the National Bureau of Standards.
- Each processing phase of a system flowchart usually involves preparing one or more control reports.
- These flowcharts depict an electronic job stream of data through processing phases of an AIS, and therefore illustrate audit trails.

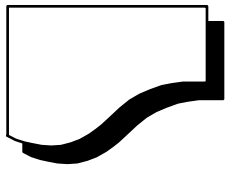
Common System Flowchart Symbols

Computer Processing

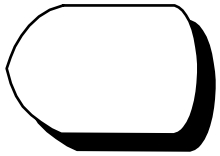
Input/Output



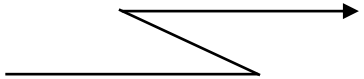
On-line keying



Document

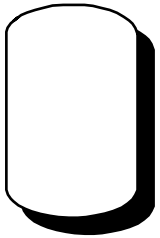


Screen Display



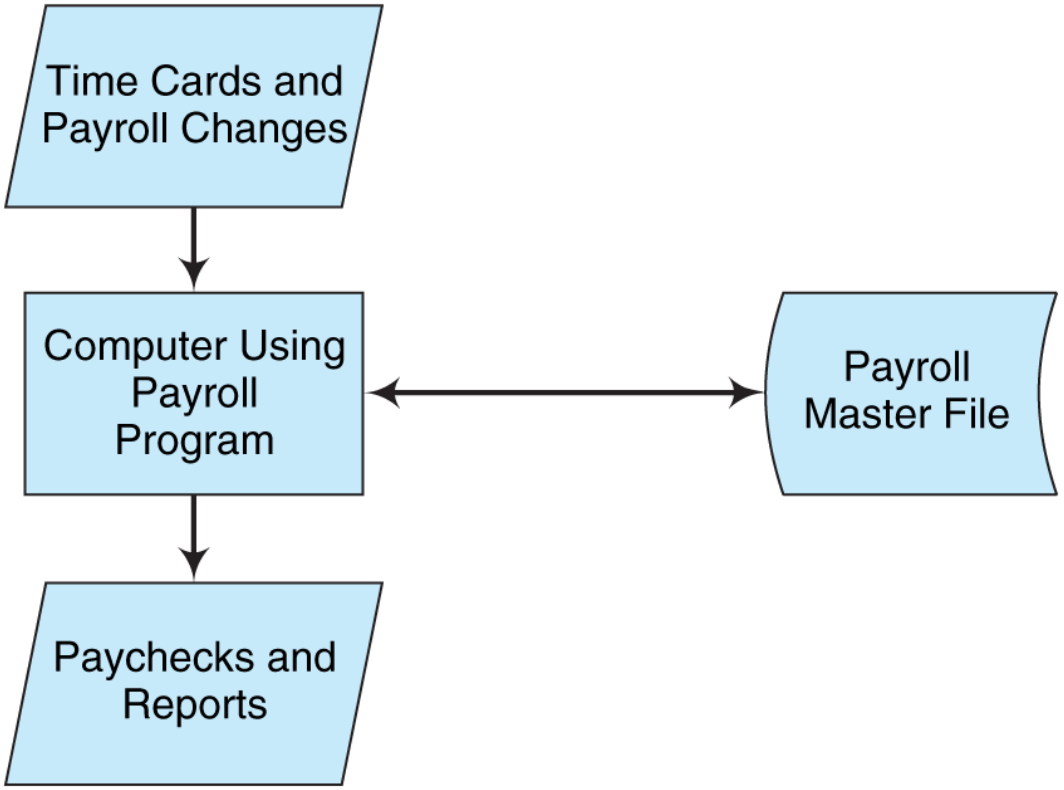
Communication Link

On-line Storage



Magnetic Disk

System Flowchart Preparing a Payroll



Systems Flowcharting Guidelines

- Arrange to read from top to bottom and left to right.
- Use appropriate, standard symbols.
- Always use a process symbol between an input and an output symbol. This is called the sandwich rule.
- Use connectors to avoid crossed lines and cluttered flowcharts.

Systems Flowcharting Guidelines

- Sketch a flowchart before designing the final draft.
- Use annotated descriptions and comments in flowcharts for clarification.

Systems Flowcharting Guidelines

Question

The *sandwich rule* states that:

a. You should only create logic diagrams that have some "meat" in them

b. Every diagram should have a cover page and a summary page

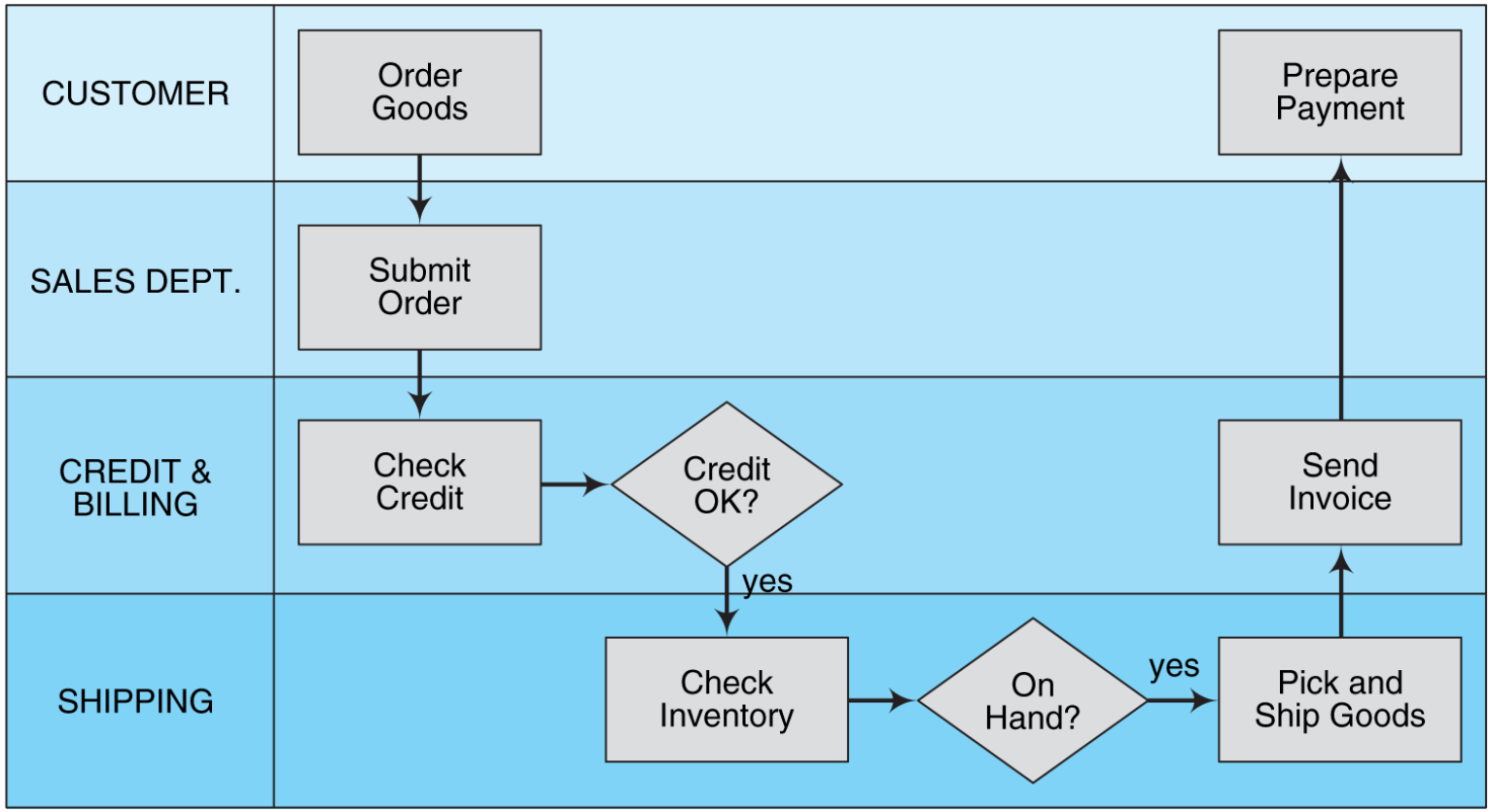
c. A processing symbol should be between an input and an output symbol

d. In DFDs, there should always be data flow lines leading to and from files

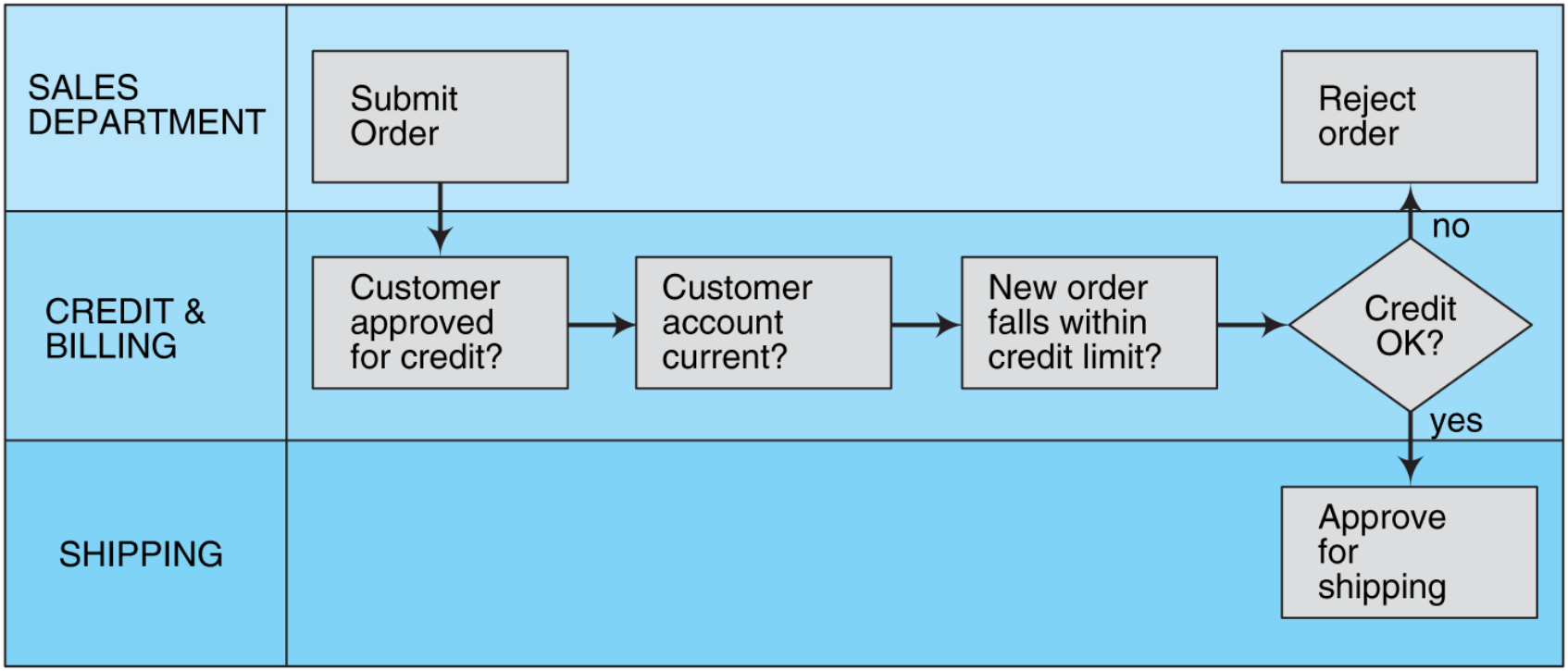
Process Maps and Data Flow Diagrams

- **Process maps** document business processes in easy-to-follow diagrams.
- **Data flow diagrams (DFDs)** are primarily used in the systems development process as a tool for analyzing an existing system.

Process Map for the Order Fulfillment process



A Second-level Process Map



Guidelines for Drawing Process Maps

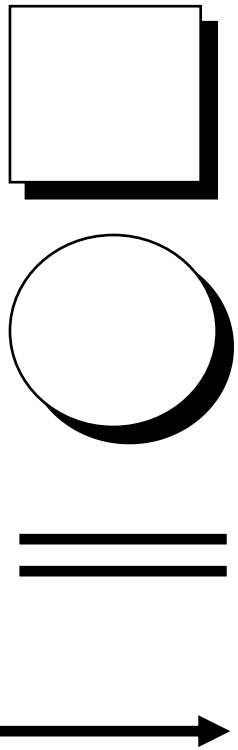
- Identify and define the process of interest to stay focused.
- Understand the purpose for the process map.
- Meet with employees to get their ideas, suggestions, and comments.
- Remember that processes have inputs, outputs, and enablers.

Guidelines for Drawing Process Maps

- Show key decision points.
- Pay attention to the level of detail you capture.
- Avoid mapping the “should-be” or “could-be”. Map what is.
- Practice, practice, practice.

Data Flow Diagrams
Symbols used

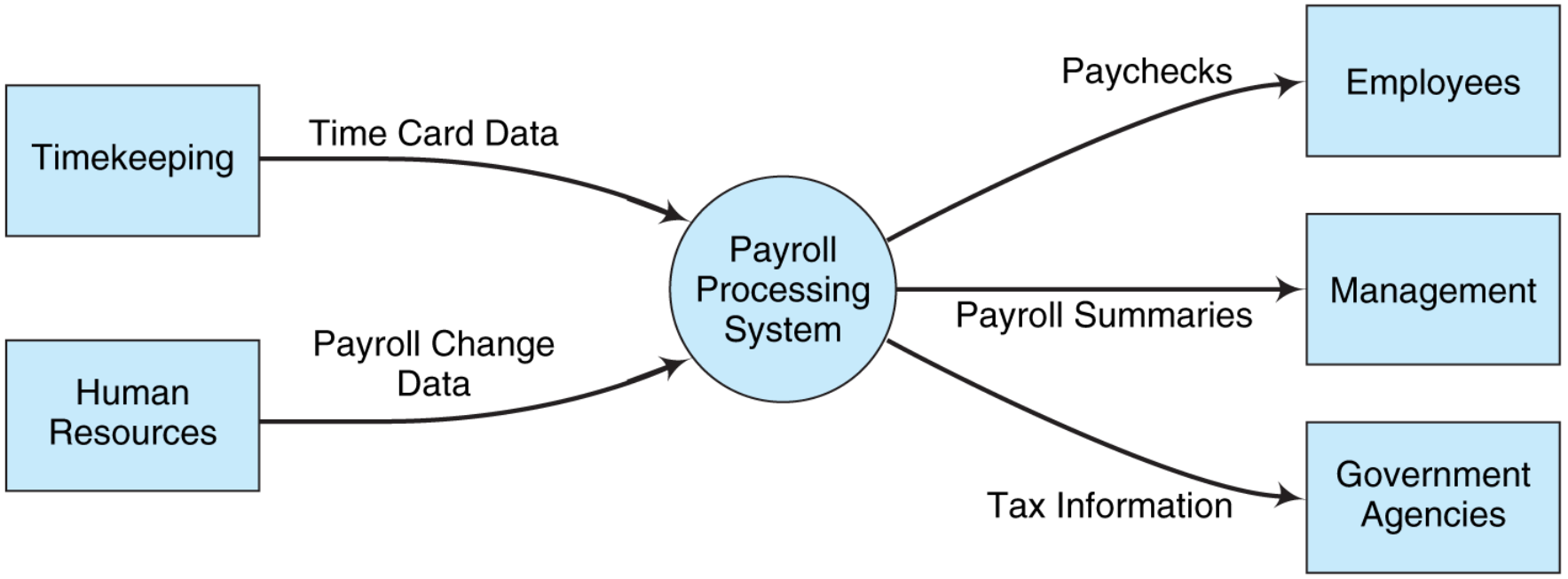
- A square represents an external data source or data destination.
- A circle indicates a internal entity that changes or transforms data.
- Two horizontal lines represent the storage of data. This is usually a file.
- A line with an arrow indicates the direction of the flow of data.



Parts of the DFD

- Context diagram an overview of the system
- Physical Data Flow Diagrams – first level of detail
- Logical Data Flow Diagrams –idea of what participants do

Context diagram



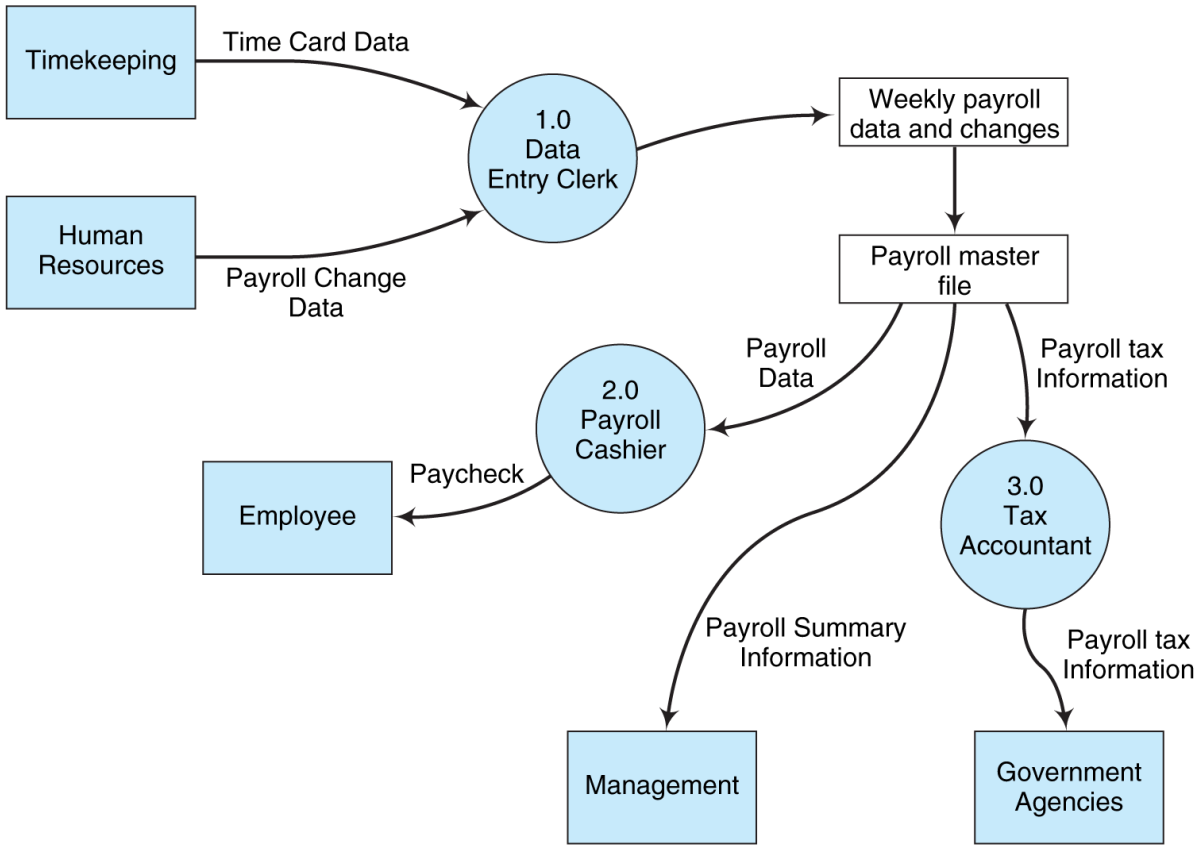
Context Diagrams

- **Data flow diagrams are usually drawn in levels that include increasing amounts of detail.**
- **A top level (or high-level) DFD that provides an overall picture of an application or system is called a context diagram.**
- **A context diagram is then decomposed, or exploded, into successively lower levels of detail.**

Physical Data Flow Diagrams

- Resemble the document flowcharts
- Focus on physical entities as well as the tangible documents, reports, and similar hard-copy inputs and outputs that flow through the system
- List the job title of one typical employee
- Are simple, more readable, and therefore more easily understood

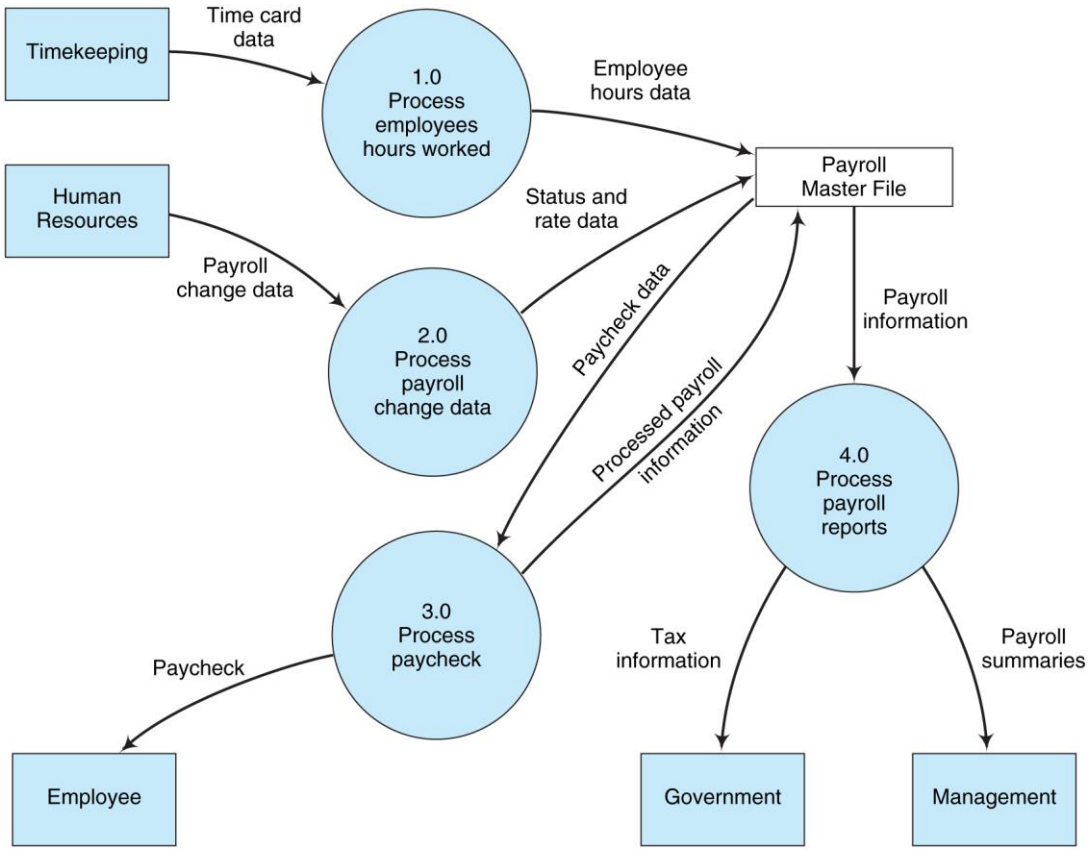
Physical Data Flow Diagrams



Logical Data Flow Diagrams

- Decompose DFDs into successive levels
- Address what participants do.
- Consist of bubbles – each bubble contains a verb that indicates a task the system performs.
- Help designers decide
  - what system resources to acquire,
  - what activities employees must perform to run these systems, and
  - how to protect and control these systems after installation.

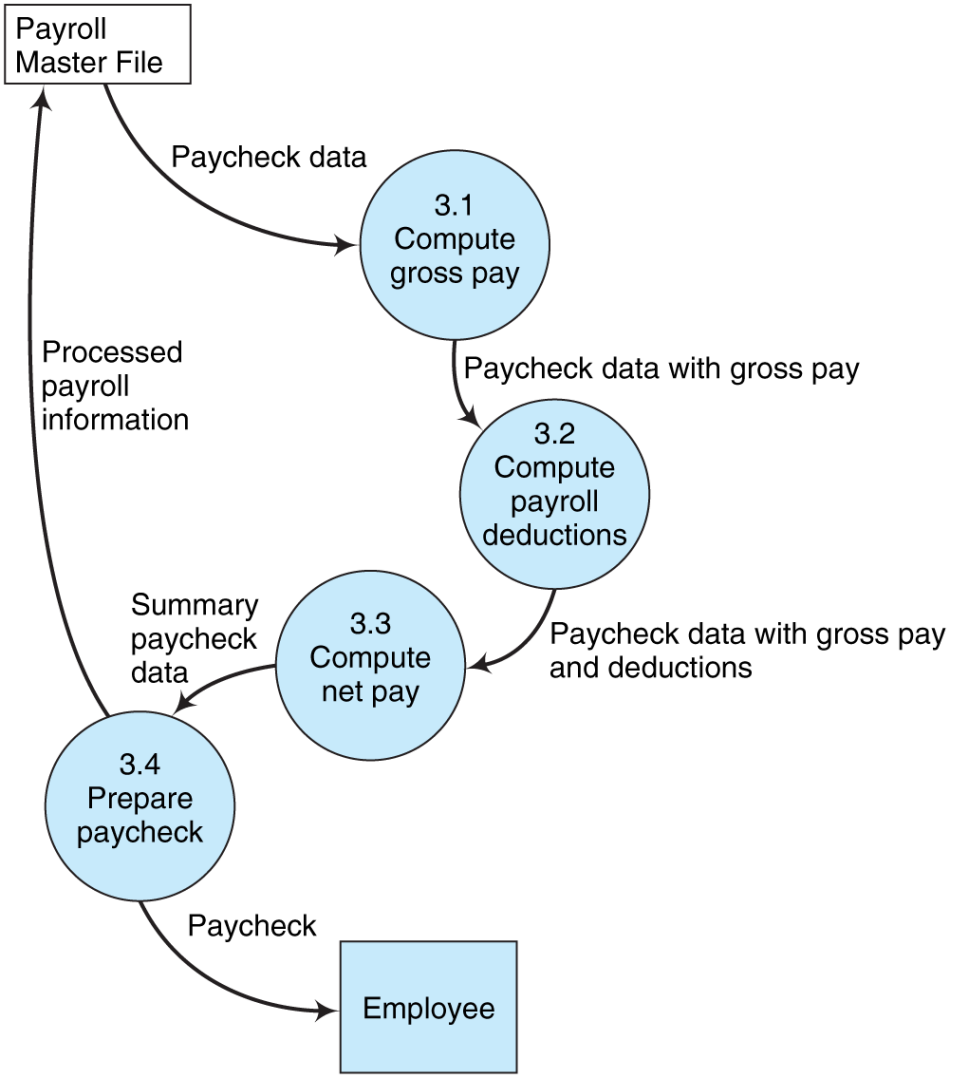
Logical Data Flow Diagrams



Decomposition

- Is the act of exploding data flow diagrams to create more detail.
- Level 0 data flow diagrams may be exploded into successive levels of detail. The next level of detail would be a level 1 data flow diagram.
- The DFDs become linked together in a hierarchy, which would fully document the system.

Decomposition



Guidelines for Drawing DFDs

- Avoid detail in high level DFDs.
- Ensure that between five and seven processes are in each DFD
- Give different data flows different names.
- Ensure all data stores have data flows both into them and out of them.
- Include even temporary files in a DFD.

Guidelines for Drawing DFDs

- Classify most of the final recipients of system information as external entities.
- Classify personnel and departments that process
  the data of the current system as internal entities.
- Display only normal processing routines in high-level DFDs.
- Use only one entity to represent several system entities that perform the same task,

Guidelines for Drawing DFDs

Question

Which of these is *not* a good guideline to follow when creating DFDs?

a. Avoid detail in high-level DFDs

b. Avoid drawing temporary files in DFDs

c. Classify most of the final recipients of system outputs as external entities

d. Avoid showing error routines or similar exception tasks

Other Documentation Tools

- **Program flowcharts**

  Organizations use structured programming techniques to create large computer programs in a hierarchical fashion

- **Decision tables**

  Organizations use a table of conditions and processing tasks that indicates what action to take for each possibility.

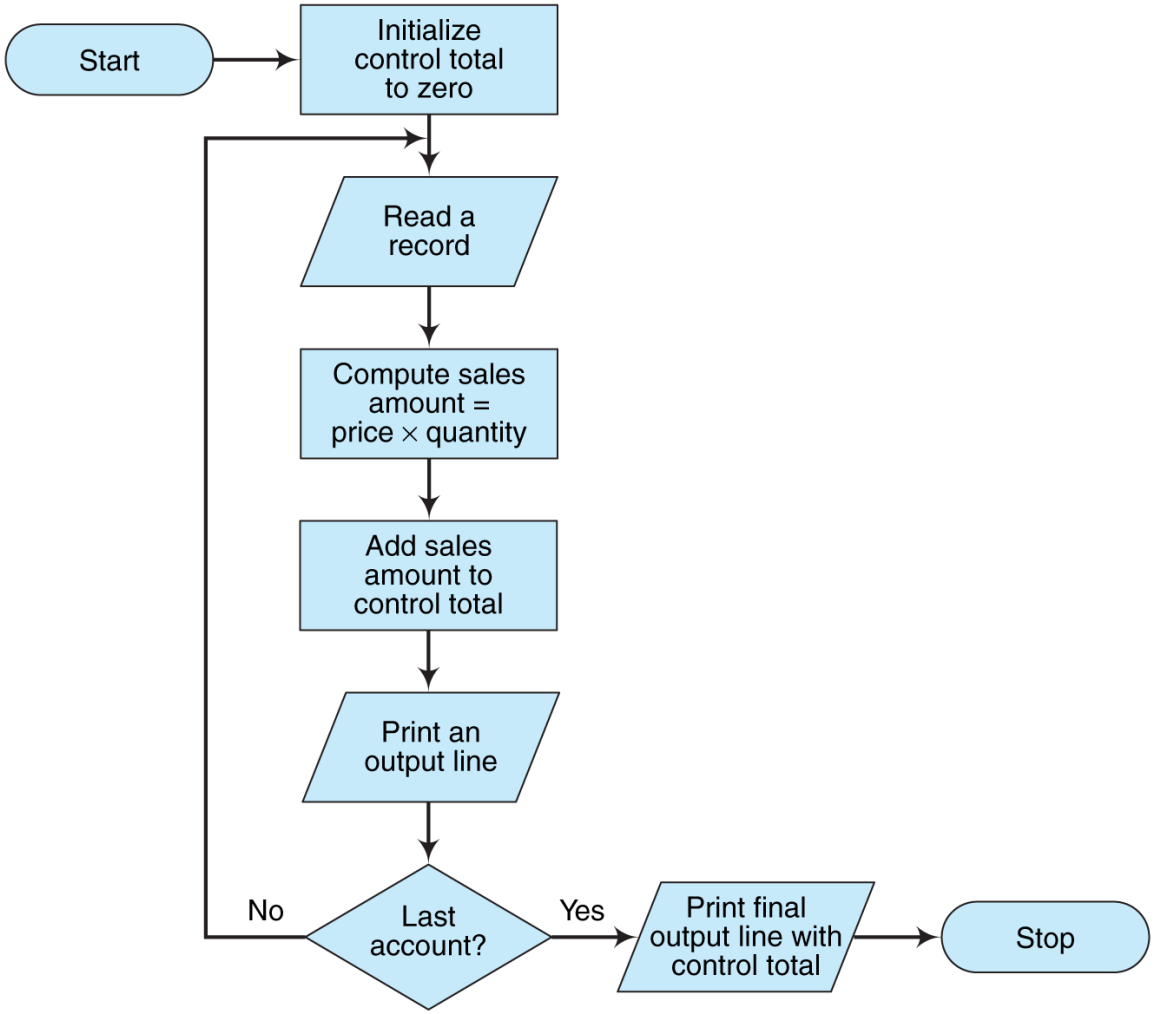
- **Software Tools for Graphical documentation and SOX compliance**

  - **Microsoft Word, Excel, and PowerPoint**
  - **CASE Tools**
  - **SOX Compliance**

Program flowcharts

- outline the processing logic
- indicate the order of processing steps
- present the steps in a *structured walk-through which* helps the reviewers
  - assess the soundness of the logic,
  - detect and correct design flaws, and
  - make improvements
- macro program flowcharts serve as an overview of the data processing logic

Program flowcharts

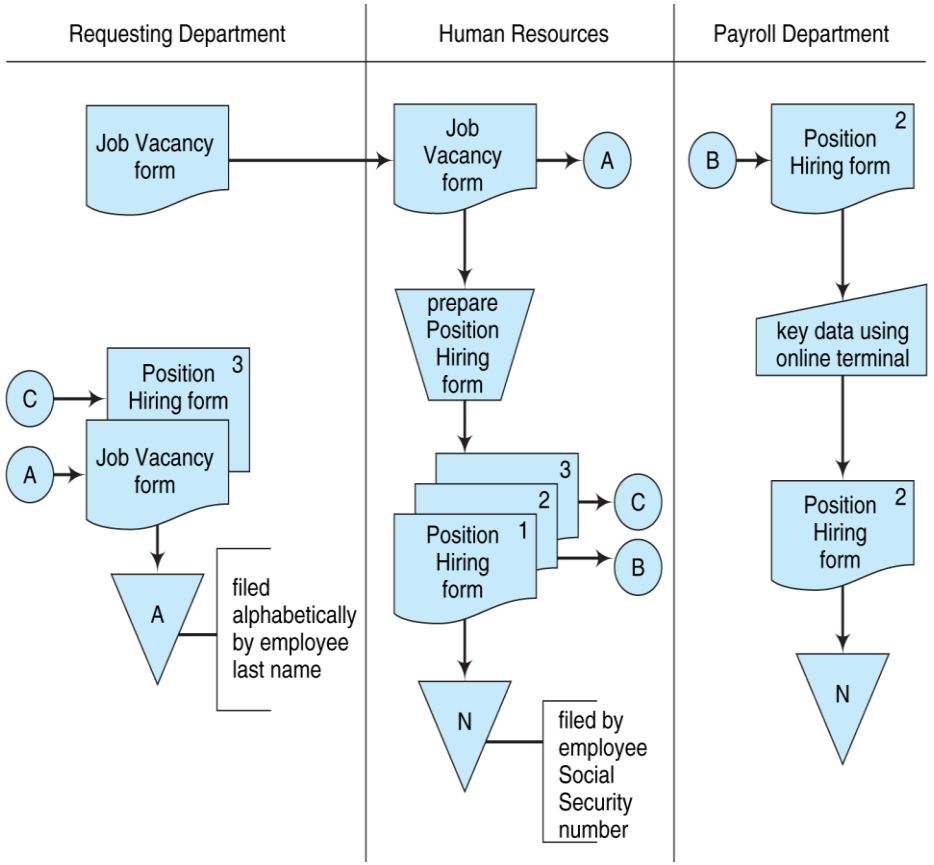


Flowcharts

Question

The diagram here is most likely a:

a. **document flowchart**
b. **system flowchart**
c. **data flow diagram**
d. **program flowchart**



Decision Tables

A decision table

- **is a matrix of conditions and processing tasks that indicate what action to take for each possibility,**
- **is used when the computer program involves many conditions and subsequent courses of action,**
- **is used as an alternative to program flowcharts or in addition to the flowcharts.**

Decision Tables

The drawbacks of a decision table are

- **they do not show the order in which a program**
  tests data conditions or takes processing actions
- **require an understanding of documentation techniques beyond flowcharting**
- **require extra work to prepare, which may not be cost effective**

Decision Tables

		Rules				
		1	2	3	4	
	Conditions					
Condition stub	Account balance less than $5	*Y*	*N*	*N*	*N*	Condition entries
	Account balance less than $1,000	*	*Y*	*	*N*	
	Account 1 year old or less	*	*	*Y*	*N*	
	Actions					
Action stub	Pay no interest	*X*				Action entries
	Pay 5 percent interest		*X*	*X*		
	Pay 5.5 percent interest				*X*	

Software Tools for Graphical documentation and SOX compliance

Microsoft Word, Excel, and PowerPoint

- All the programs have the "AutoShapes" option for the graphic symbols and logic diagrams
- Excel can create large drawings and has the option to embed computed values in flowcharting symbols.

CASE Tools

- Has capabilities of graphical documentation software that exceed those of word-processing or spreadsheet packages.

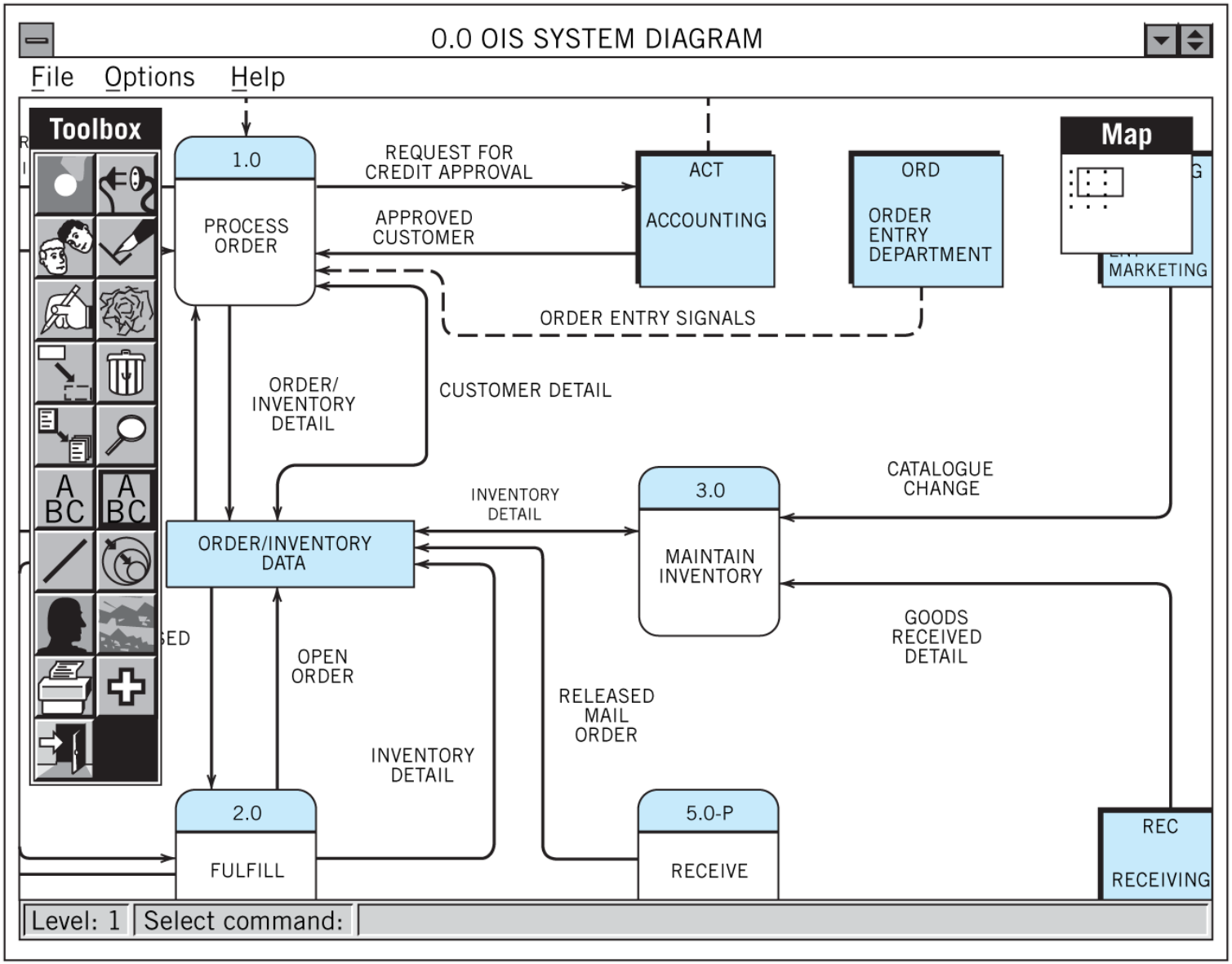
SOX Compliance Software

- Enable businesses to reduce the time and costs required to satisfy Sarbanes Oxley Act of 2002 requirements.

CASE Tools

- **CASE is an acronym for *computer-assisted software engineering.***
- **CASE tools automate costly, inefficient, slow documentation tasks.**
- **CASE tools can reduce the time and cost to produce high-quality documentation for new systems, thus supporting rapid application development (RAD).**

CASE Tool--Excelerator™



End-User Computing

End-user computing

- **refers to the ability of non-IT employees to create their own computer applications,**
- **is important for end-users to document applications they develop.**

Importance of End-User Documentation

- End users require complete, easy-to-follow training manuals, tutorials, and reference guides.
- Documentation is important for learning how to accomplish things or undo mistakes.
- Documentation is also important for end users as time is wasted when other employees need to alter a system but lack the basic documentation to accomplish this task.

Policies for End-User Computing and Documentation

1. Formally evaluate large projects.
2. Adopt formal end-user development policies.
3. Formalize documentation standards.
4. Limit the number of employees authorized to create end-user applications.
5. Audit new and existing systems.