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Accounting Information Systems

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A.I.S. Class 9: Outline

- Problems 9 & 10: Questions?
- REA Modeling - a formal approach
- Extended REA Ontology
- Group Work
- Designing the Data Repository Structure for RDBMS
- Implementing the Design
- Group Projects – Flowcharting

Problems 9 & 10: Questions?

REA Modeling - a Formal Approach

Terminology for Events:

Murthy & Groomer	Denna	David	McCarthy	Gillett
Economic	Core	Economic	Economic	Economic
Non-economic	Support	Business	Commitment	Commitment
			---	Business
Information	Information	Information	Information	Information

REA Modeling - a Formal Approach

- Economic events increase or decrease economic resources
- **Resources are scarce, have utility and are under the control of an enterprise**
- Agents are those who participate in events

REA Modeling - a Formal Approach

- Economic exchanges are pairs of related events
- Duality relationship
  - In an economic exchange, one resource is incremented while another is decremented
  - The dual events need not be simultaneous nor need one be a precursor to the other

REA Modeling - a Formal Approach

- Synergy relationships
  - Multiple events that occur in conjunction with each other and result in the whole being greater than the sum of the parts

REA Modeling - a Formal Approach

- Identify each economic exchange
- Model each exchange using REA
- Perform view integration to consolidate exchange diagrams
- Verify that there are events to increment and decrement each resource
- Verify that every event participates in a duality relationship
- Integrate supporting business events

REA Modeling - a Formal Approach

- A more radical view of events is taken here:
  - only needed events should be added
  - they should be modeled in accordance with business realities rather than traditional accounting conventions
  - this view facilitates business process reengineering

REA Modeling - a Formal Approach

- Information processes are not recorded
- Database implementations tend to filter at the reporting stage whereas traditional accounting information systems have tended to filter at the recording stage

REA Modeling - a Formal Approach

- Key characteristics of REA Systems
  * Support all critical events
  * Store a detailed history of events
  * Store data in an integrated repository
  * Are able to retrieve and manipulate data to meet user needs
  * Process events as they occur
  * Use directed REA design and implementation
  * Prepare financial statements without journal entries and a general ledger

Event-Oriented Modeling

- Extended REA Ontology (Gillett 2003/6):
  * Economic Resources (R)
  * Significant Events
    - Economic Events (E)
    - Commitments (C)
    - Business Events
      - Instigation (I)
      - Facilitation (F)
      - Terminal (T)
  * Economic Agents (A)
    - Internal Agents
    - External Agents
  * Business Location (L)

Facilitation and Terminal events are best thought of as the beginning or end of economic events or commitments that we choose to record separately

Event-Oriented Modeling

- Extended REA Ontology (Gillett 2003/6):
  - Relationships
    - Duality (E – E)
      - Transfer
      - Transformation
    - Resource-flow (E – R)
      - Inflow
        - » Take
        - » Production
      - Outflow
        - » Use (entirely)
        - » Consumption (in small parts)
        - » Give
    - Participation (E – A)
      - Inside
        - » Accountability
        - » Authorization
      - Outside
    - Site (E – L)

Event-Oriented Modeling

- Extended REA Ontology (Gillett 2003/6):
  - Relationships
    - Linkage (R – R)
      - Composition: Shirts are composed of fabric, thread, buttons, labels, etc.
      - Substitution: White Packing Tissue substitutes for Ivory Packing Tissue
    - Association (A – A)
      - Responsibility: Managers are responsible for Secretaries
      - Assignment: Salespersons are assigned to Customers in their region
      - Cooperation: One Vendor cooperates with another Vendor
    - Custody (A – R)
      - Cashier has custody of Petty Cash
    - Designation (A – R)
      - Customer designates a new Ship
    - Certification (A – R)
      - Vendors certified to supply specific Inventory – Approved Vendors List

Event-Oriented Modeling

- Extended REA Ontology (Gillett 2003/6):
  - Relationships
    - Fulfills (C – E)
      - Contract: Shipment fulfills the Sales Order
      - Schedule: Production fulfills the Job Order
    - Reserves (C – R)
      - Sales Order reserves Finished Goods
    - Partners (C – A)
      - Customer partners the Sales Order
    - Reciprocal (C – C)
      - Materials Requisition is the reciprocal of the Production Order

We are recording the (mutual) commitment to the (non-cash) initial event in economic exchanges; strictly, commitment events are paired in reciprocal relationships.

Event-Oriented Modeling

- Extended REA Ontology (Gillett 2003/6):
  - Relationships
    - Instigates (I – C, I – E, I – F)
      - Requisition instigates Purchase Order
    - Facilitates (F – E, F – C)
      - Picking facilitates Shipping
    - Necessitates (E – T, C – T)
      - Receipt of goods necessitates Storage
    - Demands (I – R)
      - Requisition demands Inventory
    - Authorization (I – A)
      - Inventory Manager authorizes the Requisition
    - Involves (F – R), (T – R)
      - Marshals
        - » Picking marshals Inventory
    - Participation (F – A), (T – A)
      - Inside
        - » Accountability

Event-Oriented Modeling

- Economic Resource
  - Good, right, or service of value, under the control of a person
- Economic Event
  - Occurrence in time wherein ownership of an economic resource is transferred from one person to another
- Economic Agent
  - Persons and agencies who participate in the economic events of an enterprise or who are responsible for subordinates' participation

Event-Oriented Modeling

- Economic Exchange
  - Type of a business transaction where the goal is an exchange of economic resources between two persons where both parties derive higher utility after the completed business transaction
    - Usually involves two economic events each incrementing or decrementing a different resource in a *duality* relationship

Event-Oriented Modeling

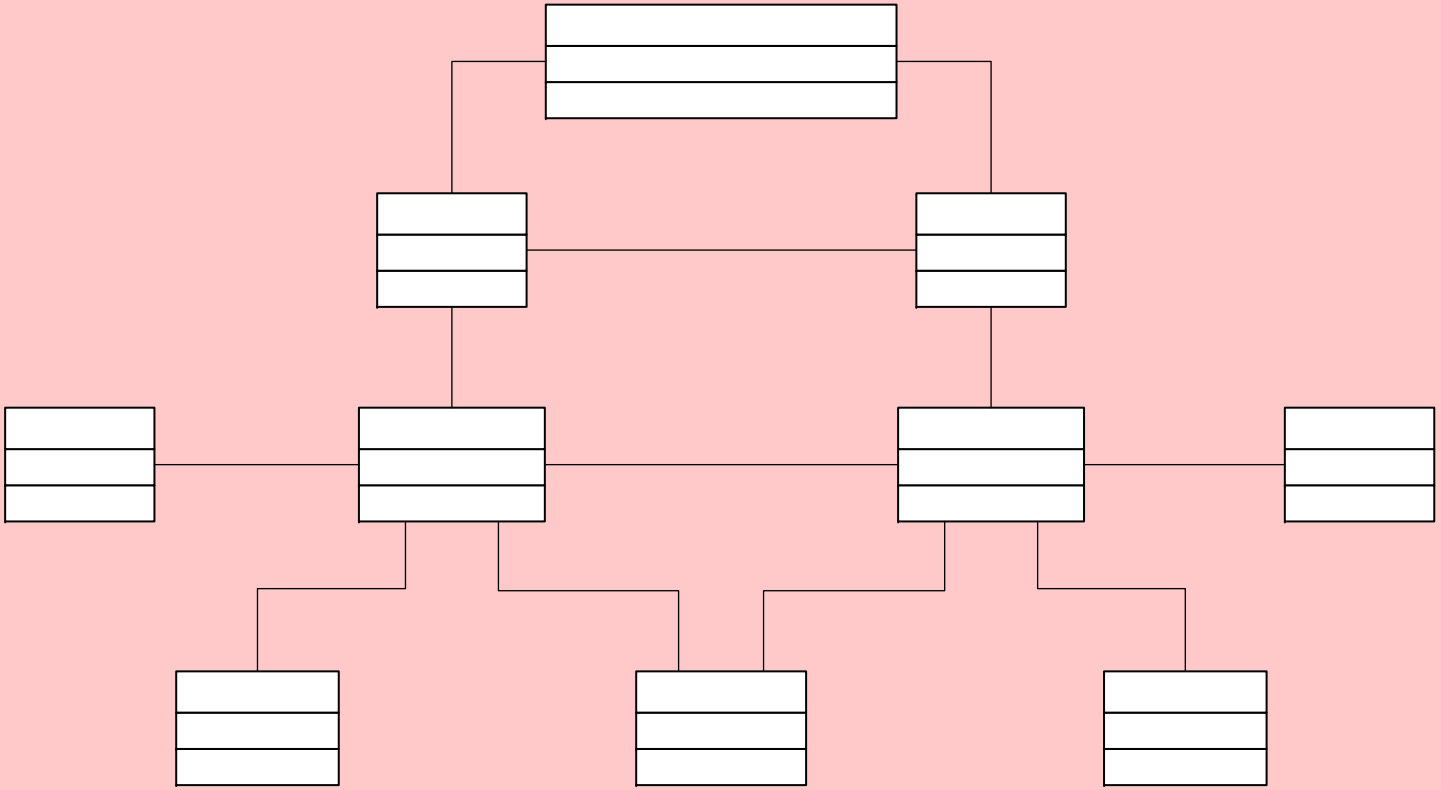
- Commitment
  - Making or accepting of a right, obligation, liability, or responsibility by a person that is capable of enforcement in the jurisdiction in which the commitment is made
- Economic commitment
  - Type of commitments by one person to transfer economic resources to another person at some specified point in the future
- Economic commitments may be *bundled* into
  - Economic agreements (incomplete, not subject to legal enforcement)
  - Economic contracts (complete, enforceable)
- We will often use informal *mutual commitments*
  - *E.g., Sales Order, Purchase Order*

Event-Oriented Modeling

- Economic Claims
  * Expectation of one person to receive a future inflow of economic resources from another person because of an economic exchange which is presently incomplete
    - A claim is *materialized* by an event in an economic exchange
    - It is *settled* by a requiting event in the economic exchange
      – e.g. Accounts Receivable

Event-Oriented Modeling

- Economic Commitments



Event-Oriented Modeling

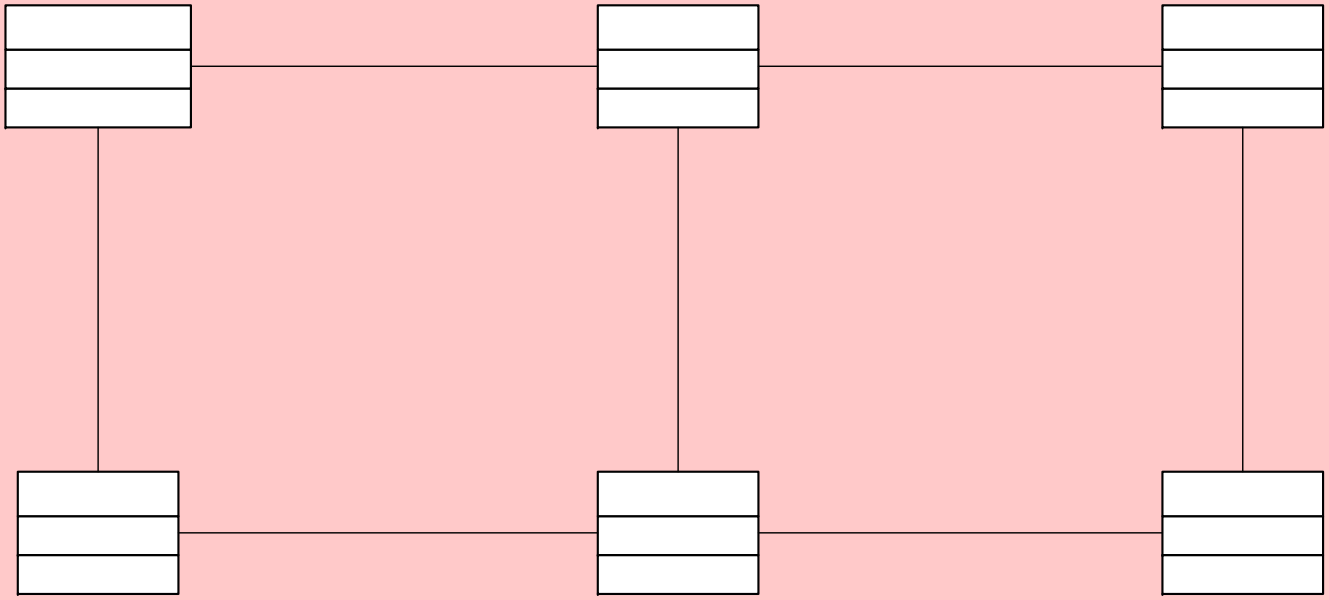
- For many kinds of resources, we want to monitor and control types, as we have discussed:
  - E.g., we may identify books by ISBN – this refers to books of a particular type (title, author, etc.), not to individual copies
- For other resources, we want to monitor and control individual items:
  - E.g., individual ships we are building for our customers
- Sometimes, we want a mixture of both approaches:
  - E.g., a customer orders an automobile of a particular type . . .
  - . . . but we deliver an specific automobile with a unique VIN
- These considerations lead us to add *typification*

Event-Oriented Modeling

- REA Ontology – Typification
  - Association between a concrete entity and the abstract specification of its grouped properties
  - The base classes of the REA Ontology are extended by the addition of related type classes, related to them by the relationship *typifies*
  - An entity type is a subset of all the possible instances of the entity:
    - Resource (R) – Automobile:
      Resource type (RT) – Automobile model
    - Event (E) – Order:
      Event type (ET) – Telephone Order
    - Agent (A) - Customer:
      Agent type (AT) – Business customer
  - Types may be useful to document *business policies* – i.e., what *should* happen rather than what *did* happen

Event-Oriented Modeling

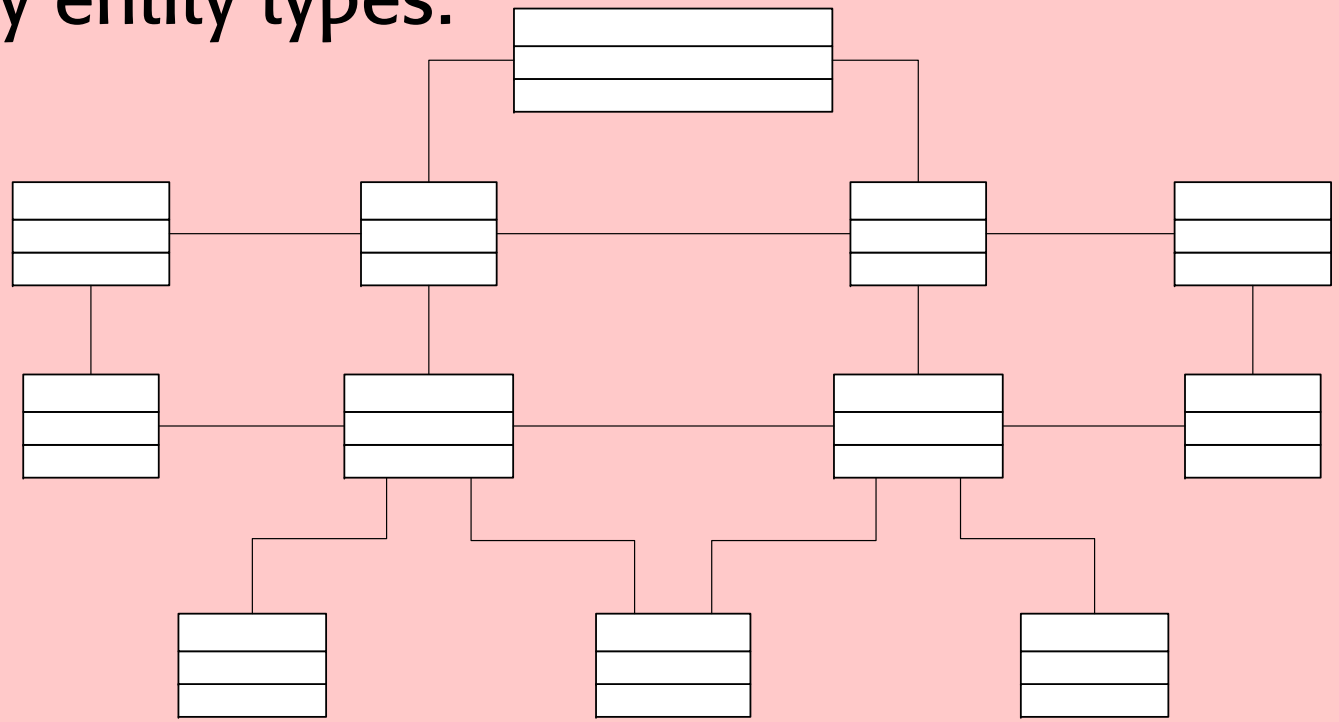
- Typification for Business Policies



* E.g., Only Business Customers may place telephone orders
* E.g., Telephone orders will not be accepted for sports cars

Event-Oriented Modeling

- Economic Commitments may, minimally, specify only entity types:



Group Work

- Working in your groups, please prepare an REA diagram in UML format for the Sheldon Shirts Sales cycle

Sheldon Shirts Sales Cycle

- Step 1: Identify the significant events
  - * Commitment — Sales order
  - * Facilitation — Pack goods
  - * Economic — Ship goods
  - * Economic — Receive cash
  - * Economic — Return goods
  - * Economic — Credit Allowance

Sheldon Shirts Sales Cycle

- Step 2: Identify the related resources
  * Finished goods inventory
  * Cash account

Sheldon Shirts Sales Cycle

- Step 3: Identify the related internal and external agents
  - Salesperson
  - Warehouse operator
  - Shipping clerk
  - Receiving clerk
  - Sales director
  - Accounts receivable clerk
  - Customer
  - Shipper

Sheldon Shirts Sales Cycle

- Step 4: Identify relationships between entities

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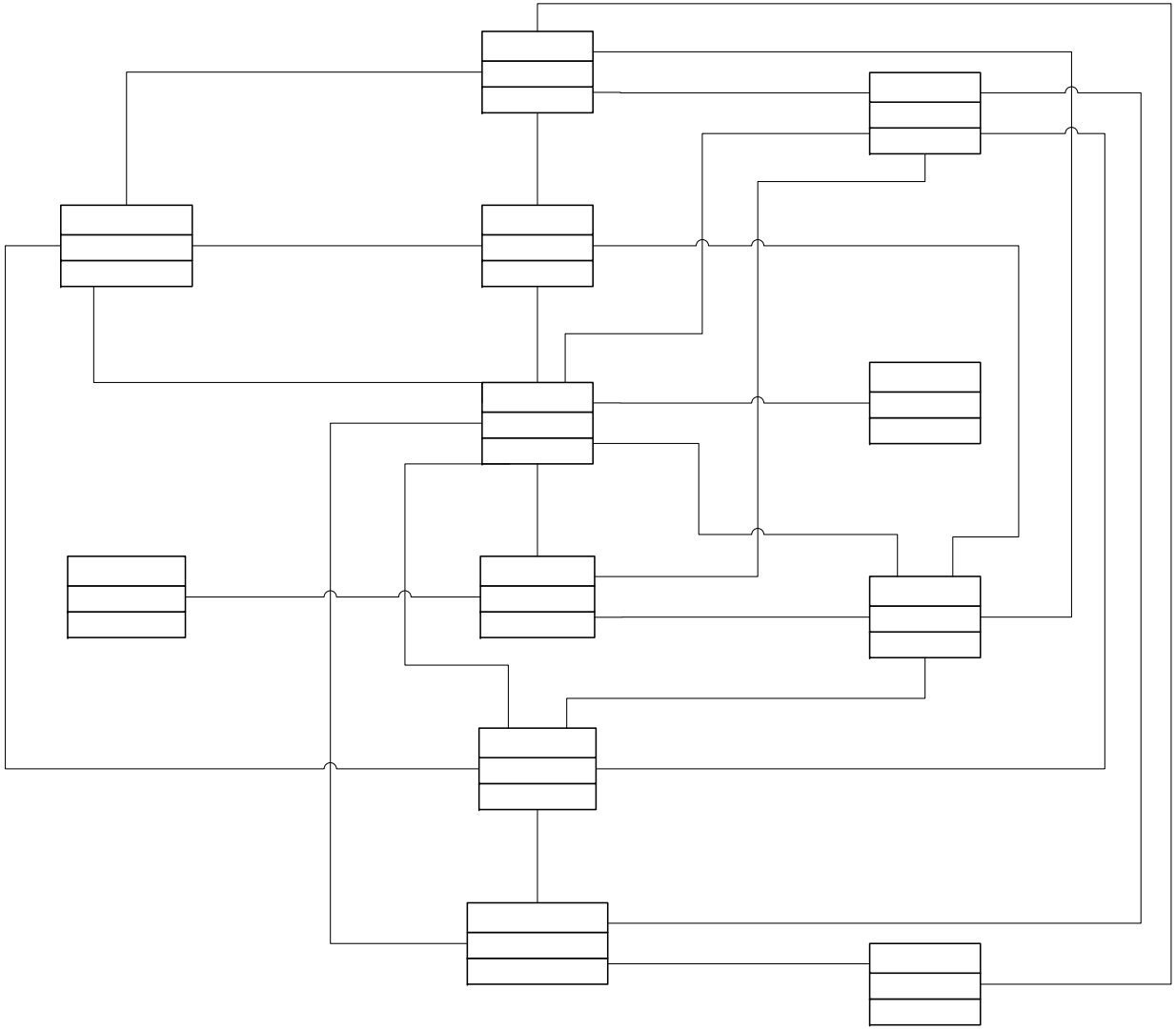
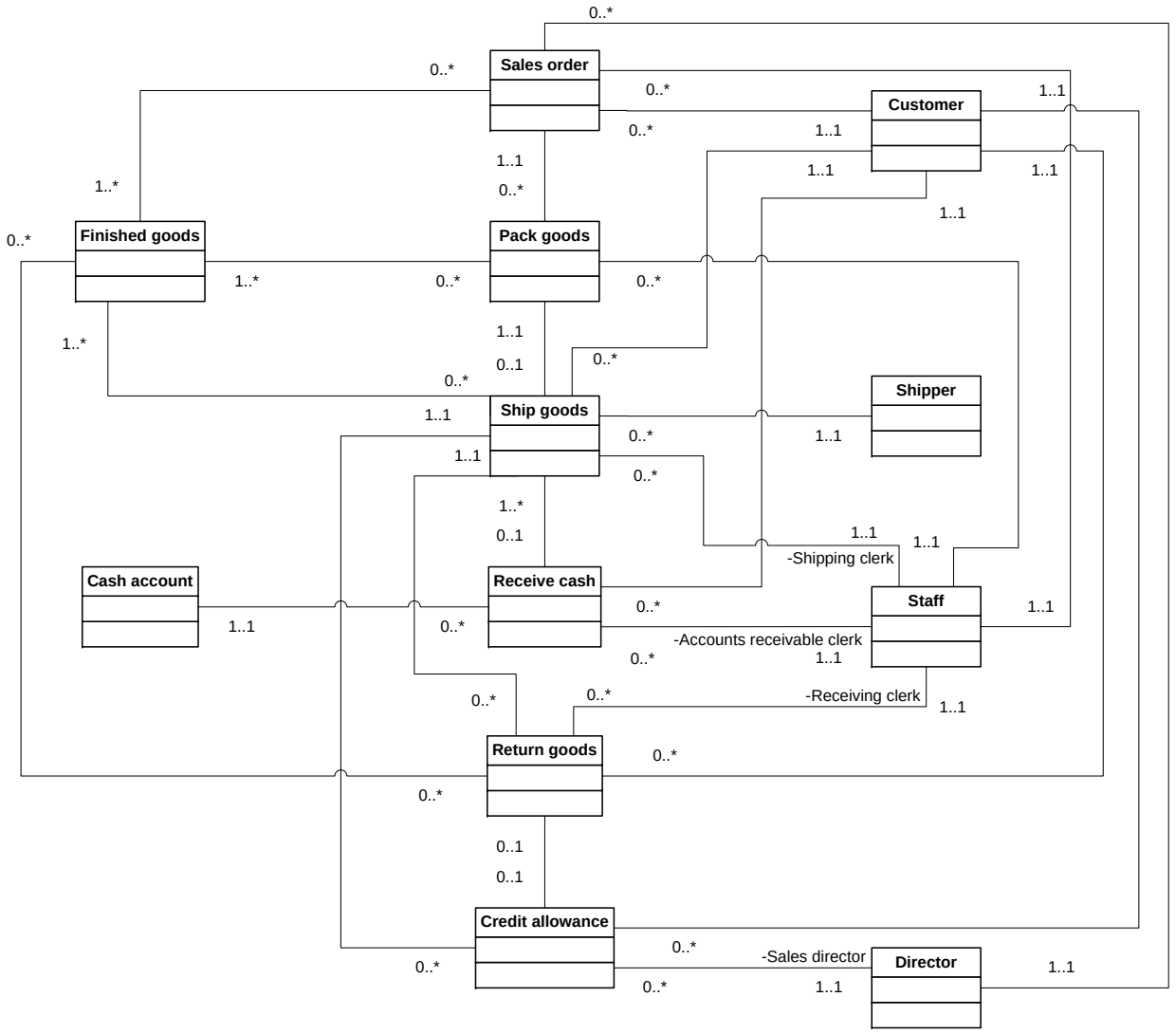


Sheldon Shirts Sales Cycle

- Step 5: Specify the optionalities and cardinalities of the relationships

Accounting Information Systems

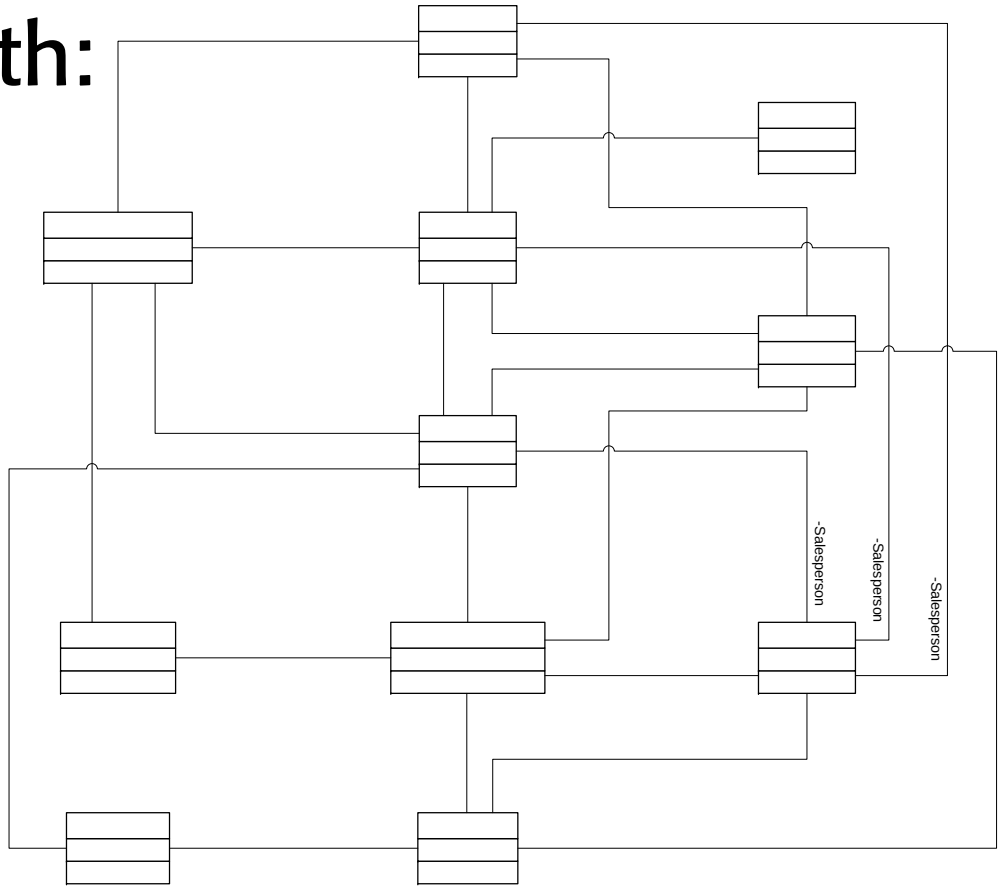


College Computing

- Compare this with:

Note:
Instigation event
Resource type

What kind of event is "Quotation"?



Designing the Data Repository Structure for RDBMS

- There are three main issues involved in this step:
  * Identifying the required tables
  * Linking the tables
  * Specifying the attributes for the tables

Identifying Required Tables

- Every entity in the REA model will require a table with a primary key (subject to a possible decision to merge certain tables together during linking, or omit tables with only one row)
- In other words, there should normally be a table for every:
  * resource
  * event
  * agent

Identifying Required Tables

- Additional tables may be required to model certain types of links between entities (see next slide)
- Finally, tables may be required for reference purposes by the information system (e.g., tables of valid State Codes, Discount Codes, etc.)

Linking Tables - Choices

- Create separate Link table
  * will always work
  * may often be unnecessary
  * sometimes the only choice (e.g., M:M)
- Post foreign keys
- Combine tables
- All three choices would work for 1:1

Linking Tables

- 1:1 Links
  * collapse the two entities into a single table
    or
  * post the primary key of either table as a foreign key in the other
- 1:M and M:1 Links
  * post the primary key for the '1' table as a foreign key in the 'M' table
- M:M Links
  * create a new Link Table with the primary keys from the original tables forming a composite key; add any uniquely defined attributes

Linking Tables

- Except:
  - For optional entities
    - always treat as if their cardinality were M
    - i.e., treat both (0,1) and (0,*) entities as (0,*)
  - When modeling two events linked 1:1
    - post the key of the first event as a foreign key in the table for the second
  - When modeling two events linked1:M where the '1' event follows the 'M' event
    - treat the link as a M:M link – i.e., create an additional Link Table

Specifying Attributes

- Primary keys are identified when tables are formed
- Foreign keys are added in accordance with the rules for linking
- Other non-key attributes should be added based on the requirements identified at Step 6 of REA modeling

Specifying Attributes

- Proposal Table
  (Proposal#, [Scientist#] , DateSubmitted, etc.)
- Proposal-Scientist Link Table
  ([Proposal#], [Scientist#])
- Proposal-Equipment Link Table
  ([Proposal#], [Equipment#])
- Proposal-Chemicals Link Table
  ([Proposal#], [Chemical#], Quantity, Procedure)

Implementing the Design

- Create the Access tables required by the design
- Designate the primary keys
- Establish relationships between tables
- Create forms to maintain the tables for each resource and agent
- Create (multi-table) forms for event recording processes
- Create queries to generate desired information
- Develop report formats for the desired reports
- Build a custom menu system

Group Projects - Flowcharting

- Cycles or parts of cycles omitted
- Process omitted entirely
- Non-existent process added
- Document omitted entirely
- Fictitious document produced
- Postings to fictitious journals not maintained by this company
- Activities of key individuals or departments omitted entirely
- Non-existent employees or departments shown
- Wrong flowcharting symbol used
- Symbols for automated systems used
- Wrong connector (on-page, off-page) used
- Connector not correctly identified by name (off-page) or letter (on-page)
- Connector not consistently identified by name (off-page) or letter (on-page)
- Incorrect or missing arrows on lines
- Process incorrectly described
- Processes in incorrect sequence
- Copies of document omitted

Group Projects - Flowcharting

- A single process cannot combine steps carried out at different time periods (e.g., ongoing processes and end-of-day processes)
- Extra copies of documents produced
- Copies of documents sent to wrong place
- Document appears from nowhere
- Document disappears without trace
- Document incorrectly named
- Document filed in incorrect sequence (A, C, or N)
- Documents not correctly filed together
- Documents generally should be filed after they are used, not before
- Document not correctly marked "Posted", "Paid" etc.
- Document copies not correctly and neatly stacked"
- Documents arriving or being sent at different times should not be shown together
- Journal Vouchers and Ledgers not correctly distinguished
- Confusion of General Ledger with Subsidiary Ledgers
- Wrong ledger updated
- Updated ledger omitted from diagram

Group Projects - Flowcharting

- Names of individuals used instead of Job Titles
- Incorrect or non-existent Job Titles used
- Incorrect individual or department shown carrying our process
- Important annotations omitted
- Annotations incorrect
- Flowchart covers steps NOT part of the cycles to be documented
- Inconsistent size or shading of symbols
- Filing symbol not correctly drawn
- Lines nor perpendicular or parallel to each other
- Lines “broken” and bent unnecessarily
- Dotted lines used incorrectly
- Spelling errors in procedures, document names, ledgers, individuals, departments, etc.
- Any instance of visual “messiness” that makes the document ugly or hard to decipher
- Omitting the Cash Transfers cycle
- Incorrectly copying flowcharts from the textbook, without referring to the specific particulars of the case

NEXT WEEK

- In a change to the published Timetable, we will study Chapter 10 on MONDAY of next week and Chapter 9 on Wednesday.
- This will mean that the readings and Quiz due dates for next week are inter-changed
- So the Chapter 10 Quiz is due on MONDAY!