

A.I.S. Class 9: Outline

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

Problems 9 & 10: Questions?

Group Work

- Working in Groups, please prepare three slides to illustrate ideas or lessons learned from the paper: *Three “Events” That Define an REA Methodology for Systems Analysis, Design and Implementation*, focusing on NEW ideas and techniques

REA Modeling - a Formal Approach

Terminology for Events:

Murthy & Groomer	Denna	David	McCarthy	Gillett
Economic Non-economic	Core Support	Economic Business	Economic Commitment ---	Economic Commitment Ancillary
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):

- ★ **Economic Resources (R)**

- ★ **Business Events**

 - ◆ Economic Events (E)

 - ◆ Commitments (C)

 - ◆ Ancillary Events

 - Instigation (I)

 - Facilitation (F)

 - Terminal (T)

- ★ **Economic Agents (A)**

 - ◆ Internal Agents

 - ◆ External Agents

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

Event-Oriented Modeling

■ Extended REA Ontology (Gillett 2003):

★ Relationships

◆ Duality (E – E)

- Transfer
- Transformation

◆ Stock-flow (E – R)

- Inflow
 - Take
 - Production
- Outflow
 - Use (entirely)
 - Consumption (in small parts)
 - Give

◆ Participation (E – A)

- Inside
 - Accountability
- Outside

Event-Oriented Modeling

■ Extended REA Ontology (Gillett 2003):

★ 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):

★ 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 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):
 - * Relationships
 - ◆ Instigates (I – C, I – E, I – F)
 - Requisition instigates Purchase Order
 - ◆ Facilitates (F – E)
 - Picking facilitates Shipping
 - ◆ Necessitates (E – T)
 - Receipt of goods necessitates Storage
 - ◆ Demands (I – R)
 - Requisition demands Inventory
 - ◆ Authorization (I – A)
 - Inventory Manager authorizes the Requisition
 - ◆ Marshals (F – R), (T – R)
 - Picking marshals Inventory
 - ◆ Participation (F – A), (T – A)
 - Inside
 - Accountability

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 linked 1: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

- College Computing has a manual system, so symbols for computer processes cannot be used
- Lines not perpendicular or parallel to each other
- Lines “broken”
- Connectors within pages without identification
- Connectors between pages without identification
- Time Sheets are needed to calculate payroll!!!
- Don't combine ongoing process with end-of-day JV process
- Forms are filed after they are used, not before
- Forms are not permitted to appear from nowhere, or to disappear without trace

Group Projects - Flowcharting

- Documents cannot flow from one department to another within a flowchart even if they are shown on the same page; instead on-page connectors must be used to show exit and entry
- Some groups created forms that do not exist; e.g. for Goods Received
- Fixed Assets does not involve inventory control, or incomplete or faulty goods
- Petty cash is omitted – why?
- Use job titles not names
- JVs are filed chronologically, not numerically. Why?