Announcements

Quiz – started Now in myCourses
(closed book!)
Teams formed - sit with your group from now on –
when in classroom ;^)
Project Deliverables
Agenda

Lecture
Team Logistics
   Come up with classwide discussion items
Homework
Organizing Domain Logic

SWEN-343
Learning Objectives

Organize ERP domain logic
For your project

Keep these activities in mind
(DETOUR) Data Models are Paramount for ERP

Review of Data Modeling

What do you remember?
Data Models

- A data model is a specification of the information content of a system
- A data model is built on a set of concepts that can be used to describe the structure of a database
  - Available data types, relationships, and constraints
  - Basic operations for create, read, update, delete (CRUD)
  - User-defined operations and behavior and constraints
- Data definition languages (DDLs) describe structure and content
- Data manipulation languages (DMLs) describe the create, read, update, and delete (CRUD) operations
  - Queries, procedures
Data Modeling (Development Phases)

Three phases of data model development

- **Data model analysis**
  - Conceptual data model

- **Data model design**
  - Logical data model

- **Data model implementation**
  - Physical data model
Data Modeling (Development Phases)

Three phases of data model development (but do iterate!)

Data model analysis

Conceptual data model describes information in terms the users will understand
Entities (things, events, concepts), attributes (properties, characteristics) and relationships (associations)

Entity-Relationship diagrams, UML class diagrams, etc.

Problem analysis

Data model design

Logical data model describes information in a way that can be used to build a database
Relational models, object-oriented models, XML graph models, etc.
Solution design in the language of the database management system

Data model implementation

Physical data model describes information in terms of its representation in physical storage
File and record structure, data structure, access paths, indexes, etc.
Detailed design and implementation
Usually hidden (automatically managed by DBMS)
Chen-like notation

- **entity class**
- **weak entity class**
- **relationship type**
- **identifying relationship type**
- **attribute**
- **key attribute**
- **discriminator (partial key) attribute**
- **derived attribute**
- **multivalued attribute**

- **composite attribute**
- **cardinality marks**
  - 1: no more than one related entity
  - M: many (zero or more) related entity
  - i..j: at least i but not more than j related entities
- **must participate in the relationship**
- **may participate in the relationship**
Logic Patterns

Describe functional algorithms or business logic that handle information exchange between database and user interface

Well organized Domain Logic is imperative for maintenance and scalability
→ VERY important for ERP
Domain Logic Introduction

Most business applications can be thought of as a series of transactions.

Each interaction between client & server requires some logic.

Can be simple or very complex.

- pulling data -> validations, complex calculations etc...
Domain Logic Patterns

Transaction Script
Domain Model
Table Module
Transaction Script

Transactions carry out functionality
Organizes logic using procedures
  Each procedure handles a single request from presentation
  Processes it with validations & calculations
Single procedure for each action.
  Open a connection & then close it
    getAge()
    updateAge()
    getName()
    ........
Transaction Script

calculateRecognitions (contractID)

findContract (contractID)

get data

insert revenue recognition

set
Transaction Benefits

Simple, easily understandable
Works well with simple data source layer
Obvious how to set transaction boundaries
Great for simple applications.
Transaction Drawbacks

?
Transaction Drawbacks

Duplicated code with several transactions doing the same/similar things
Reasonably sized applications will likely be tangled web, without a clear structure.
Domain Model

Objects......
Build model of domain
Organized around nouns
Contains logic for validations and calculations
Each object takes part in logic it is relevant to.
Domain Model
Domain Model Benefits

Instead of one routine handle all logic for user action, each object takes a part of the logic that is relevant to it. Allow for complex logic to be handled in well organized manner.
Domain Model Drawbacks

*Relatively* complex to use
  Takes time to get used to
Database mapping
  Richer the domain model, the more complex the mapping
Domain Model

Interface with relational dbs can be tough
Example: If you have many orders, a domain model will have one order object per order
To overcome this problem, we use the TABLE MODULE
Table Module

Similar to domain as both have classes.
Domain = 1 instance for each occurrence.
New Dog object for each dog
Table = 1 instance for all occurrences.
1 Dog table
Table Module

Much like a middle ground between script and domain.
Provides structure and easy to find duplication.
Single instance that handles the business logic for all rows in a database table or view
One object handles all orders
Table Module Drawbacks

Lose much of the benefits of domain models.
Logic, inheritance and other OO patterns.
Table Module

Recordsets & Record Tables in .Net

Works with many existing technologies.
Table Module

![Diagram of Table Module]
Table vs. Domain

A *Table Module* organizes domain logic with one class per table in the database, and a single instance of a class contains the various procedures that will act on the data. The primary distinction with *Domain Model* is that, if you have many orders, a *Domain Model* will have one order object per order while a *Table Module* will have one object to handle all orders.
When to use table?

Highly based on table-oriented data, so use it when we access tabular data using a recordset.

Fit business logic into the application in a well organized manner, but do not lose the way various elements work on the tabular data.
Which to Choose?
Relative Level of Effort vs. Domain Complexity

![Diagram showing Relative Level of Effort vs. Domain Complexity]
Relative Level of Effort vs. Domain Complexity
Which to use?

Application complexity
  How to determine?
Team familiarity with each
Changing from one to the other can be expensive.
Can mix and match
  Application does not need to use one or the other.
Quiz - Script

What were the 3 primary patterns discussed today?
Recap - Transaction

What is it?
When is it used?
What are its drawbacks?
Recap - Domain

What is it?
When is it used?
What are its drawbacks?
Recap - Table

What is it?
When is it used?
What are its drawbacks?
Resources

http://martinfowler.com/eaaCatalog/