



MDE Project 5 Report

Assignment A5 (Transformations)

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Task 1: Metamodel Refinements

Objective:

The goal of this task was to apply refectory operations on the original metamodel defined in Assignment 4 (A4) to create an updated version. The refinements focused on:

- Adding/removing concepts
- Renaming concepts
- Adding/removing hierarchies
- Modifying structural features (attributes, references)
- Changing attributes

Steps Taken:

1. Concept Additions:
 - Introduced Electronics and Clothing as subclasses of the ProductItem class.
 - Added a DiscountedOrder subclass of Order with an additional attribute discountAmount.
2. Concept Renaming:
 - The Product class was renamed to ProductItem to accommodate a hierarchy for Electronics and Clothing.
3. Structural Refinements:
 - Added specific attributes for Electronics (warrantyPeriod) and Clothing (size and material).
 - Refined associations between ProductCategory and ProductItem to accommodate hierarchical categories.
4. Attribute Modifications:
 - Added loyaltyPoints to the Customer class as an integer attribute with a default value of 0.
5. Outcome:
 - The updated metamodel was created as Modified_Ecommerce.ecore and thoroughly validated to ensure it aligns with the new requirements.

Task 2: M2M Transformation Report

Objective:

To perform a Model-to-Model (M2M) transformation using ATL, enabling migration of models from the original metamodel (Ecommerce.ecore) to the refined metamodel (Modified_Ecommerce.ecore).

Steps Taken

1. Setup:

- Defined the EcomMain (input metamodel path) and EcomModified (output metamodel path) using ATL annotations.

- Created the ATL transformation module EcomATL.

2. Transformation Rules:

The following transformation rules were implemented to handle the migration of data from the original metamodel to the refined metamodel:

- **EcommercePlatformMapping Rule:**

Migrated the EcommercePlatform class by mapping its attributes (name, url) and references (customers) to the updated metamodel structure.

- **CustomerMapping Rule:**

Transformed the Customer class, preserving key attributes like name and id and preparing for further refinements.

- **CartMapping Rule:**

Mapped carts from the original model to the updated model by carrying over the id, creationDate, and lastUpdated fields.

- **PromotionMapping Rule:**

Mapped promotions while retaining their details (name, id, description, discountPercentage, startDate, endDate).

- **ReviewMapping Rule:**

Transferred review information (id, ratings, comment, reviewDate) to ensure review history is preserved in the refined model.

- **ShipmentMapping Rule:**

Migrated the Shipment class with attributes like id, courierName, cost, and estimatedDelivery.

- **CartContentMapping Rule:**

Ensured cart contents (id, quantity) were transferred correctly to the refined metamodel.

- **ProductCategoryMapping Rule:**

Mapped ProductCategory elements, preserving relationships and attributes like id, name, and description.

- **ElectronicsMapping and ClothingMapping Rules:**

Added new transformation rules to handle subclassing for Electronics and Clothing, which were introduced in the refined metamodel.

- Electronics Subclass: Handled attributes like warrantyPeriod with a default value.

- Clothing Subclass: Handled size and material attributes with default values.

- OrderMapping Rule:

Distinguished between non-discounted orders (where totalAmount < 100.0) and mapped them to the general Order class in the refined model.

- DiscountedOrderMapping Rule:

Handled orders with totalAmount ≥ 100.0 and mapped them to the DiscountedOrder subclass. Calculated a 10% discount on the total amount.

- OrderLineItemMapping Rule:

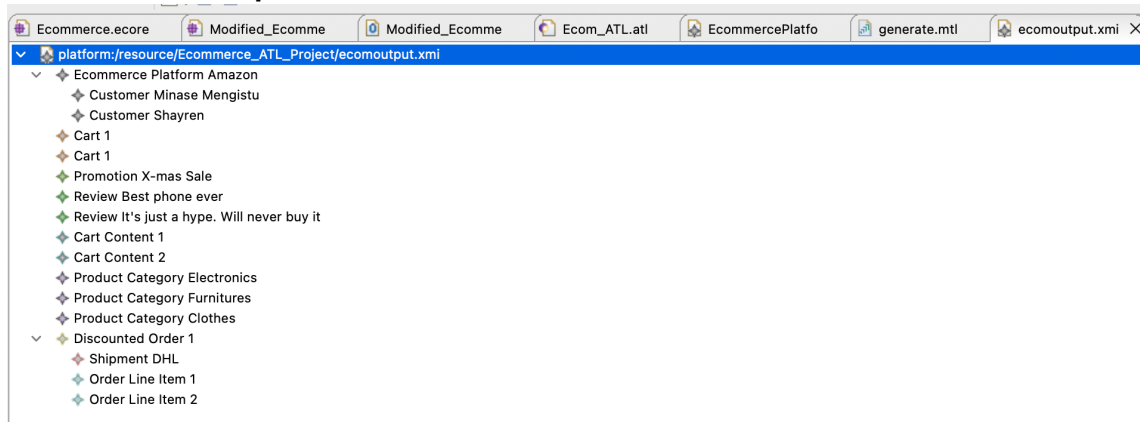
Ensured individual OrderLineItem entities were mapped correctly, maintaining relationships with ProductItem.

3. Validation:

- EcommercePlatform-Amazon.xmi file was used to validate the transformation.

- ecomoutput.xmi file was compared against the refined metamodel (Modified_Ecommerce.ecore) to ensure accuracy and completeness.

Ecomout.xmi file output



Task 3: M2T Transformation

Objective:

To implement a Model-to-Text (M2T) transformation using Acceleo, generating HTML pages that summarize the elements of the refined metamodel and provide detailed information for each modeled concept.

Steps Taken

1. Setup:
 - Defined the Acceleo module and associated the metamodel (Ecommerce.ecore) with the transformation.
 - Configured the template with encoding settings for UTF-8.
2. Generated Pages:

Index Page (index.html):

- The central entry point summarizing all key entities of the Ecommerce model.
- Links to:
 - Individual customer pages.
 - Product details pages (e.g., Nike Air Max, iPhone 16 Pro Max).
 - Product category details (e.g., Electronics, Furnitures, Clothes).
 - Specific orders (e.g., Order 1).
 - Promotions (e.g., X-mas Sale).

Customer Details Page (Customer.html):

- Lists all customers along with their attributes (name, email).
- Links to detailed individual pages for each customer.
- Displays associated orders, including details like order ID, date, and payment details.
- Includes cart information for each customer.

Product Details Pages:

- Nike Air Max (product_NikeAirMax.html):
 - Displays product details such as ID, name, description, price, stock quantity, and date added.
 - Links to the associated product category (Clothes).
- iPhone 16 Pro Max (product_iPhone16ProMax.html):
 - Provides detailed information about the product, including applied promotions (X-mas Sale) and product reviews.

Product Category Details Pages:

- Electronics (product_category_Electronics.html):
 - Describes the category with an associated list of products (e.g., iPhone 16 Pro Max).
- Furnitures (product_category_Furnitures.html):
 - Displays the category details but indicates no associated products.

- Clothes (product_category_Clothes.html):
- Lists the category's associated products (e.g., Nike Air Max).

Order Details Page (order_Order1.html):

- Includes:
- Payment details with a link to the respective payment page (Payment 1).
- Shipment details with a link to the shipment page (Shipment DHL).
- Order items linked to their respective detail pages (e.g., Order Line Item 1

and Order Line Item 2).

Promotion Details Page (promotion_XmasSale.html):

- Displays details of the X-mas Sale promotion, including its ID, name, description, discount percentage, start date, and end date.

Shipment Details Page (shipment_DHL.html):

- Includes shipment-specific details such as ID, courier name, cost, and estimated delivery date.

Order Line Item Pages:

- Order Line Item 1 (order_item_1.html):
- Displays item ID, associated product (Nike Air Max), and quantity.
- Order Line Item 2 (order_item_2.html):
- Includes item ID, associated product (iPhone 16 Pro Max), and quantity.

Payment Details Page (payment_1.html):

- Displays payment details such as ID, amount, payment method (CreditCard), payment date, and status (Pending).

Code Implementation Details

The Acceleo code includes:

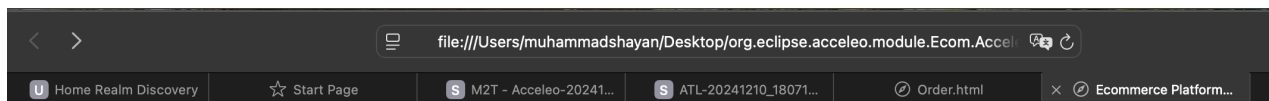
1. Dynamic HTML Generation:
 - Each template generates an HTML file for the respective entity.
 - Content dynamically integrates attributes and references from the refined metamodel.
2. Looping Through Model Elements:
 - Used for loops to iterate over elements such as customers, orders, carts, etc.
 - Ensures comprehensive coverage of the domain.
3. File Linking and Navigation:
 - Embedded links allow navigation between the pages.
 - For example, the index.html links to all detail pages, and order_Order1.html links to its payment, shipment, and order item pages.

Code Implementation Details

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1. Dynamic HTML Generation:
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Some reference images



Ecommerce Platform Overview

- [Click to go to the Customers page](#)
- [Product: Nike Air Max](#)
- [Product: iPhone 16 Pro Max](#)
- [Product Category: Electronics](#)
- [Product Category: Furnitures](#)
- [Product Category: Clothes](#)
- [Order: Order 1](#)
- [Promotion: X-mas Sale](#)

This is the Customer page

1. Minase Mengistu - [View Details](#)

2. Shayren - [View Details](#)

Name: Minase Mengistu
Email: minase@email.com
Orders: ID: 1
Date: Thu Dec 12 01:00:00 EET 2024
Status: Pending
Payment Amount: 123.4
Cart: ID: 1
Date: Thu Dec 12 01:00:00 EET 2024

Name: Shayren
Email: Shayren@email.com
Orders:
Cart: ID: 1
Date: Tue Jul 17 00:00:00 EET 25

Product: iPhone 16 Pro Max

ID: 3
Name: iPhone 16 Pro Max
Description: The latest phone from Apple
Price: \$1200.00
Stock Quantity: 1,000,000
Date Added: 2024-01-01
Product Category: Product Category Electronics
Applied Promotions: Promotion X-mas Sale
Product Reviews:

- Review: Best phone ever
- Review: It's just a hype. Will never buy it

Product Category: Electronics

ID: 1
Name: Electronics
Description: everything powered by electric
Products:

- [Product: iPhone 16 Pro Max](#)

file:///Users/muhammadshayan/Desktop/org.eclipse.acceleo.module.Ecom.AcceleoModuleEcom.html

Home Realm DiscoveryStart PageM2T - Acceleo-20241...ATL-20241210_18071...Order.htmlPromotion: X-mas SaleMinsase.html

Promotion: X-mas Sale

ID: 1

Name: X-mas Sale

Description: X-mas Sale

Discount Percentage: 25%

Start Date: 2024-12-12

End Date: 2024-12-31