

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES

Object Oriented Analysis & Design (CL-309)

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Lab Session # 05

Objectives: To Understand Analysis Classes and Robustness Analysis ECB Pattern.

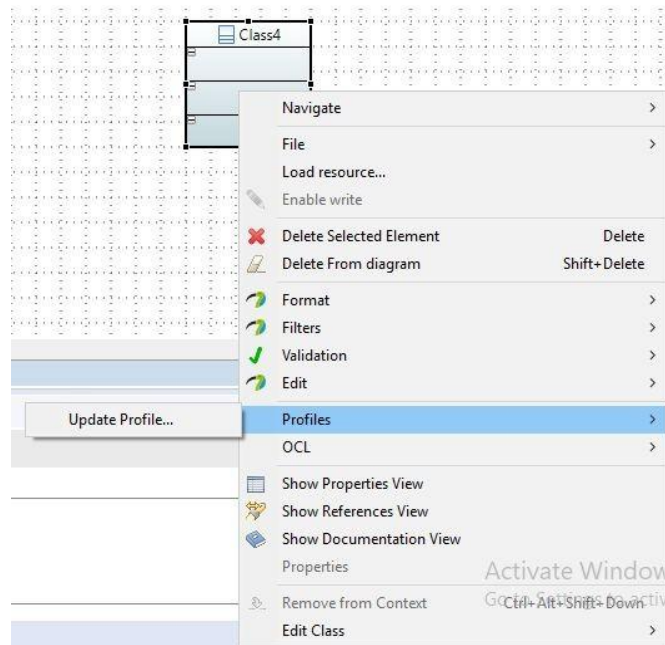
Control, Boundary, and Entity

Classes can be stereotyped as control, boundary, and entity. These stereotypes are used to increase the semantic meaning of the classes and their usage in modeling situations. These stereotypes are not found in the core of the UML specification. Rather, they are common stereotypes implemented in many UML tools and used during the design and analysis phase. They are based on the model-view-controller concept, where the entity is the model, the control is the controller, and the boundary is the view. The model-view-controller (MVC) concept is a well-used solution (pattern) for building systems with an entity model, which is presented and manipulated via a graphical user interface (GUI). Because these stereotypes are based on the MVC concept, they are very useful when dealing with GUI-based systems and also Web application frameworks, such as Struts, that implement the MVC pattern. These stereotypes are used to analyze and to realize use cases in more detail. The analysis classes are an entity class (something to be stored in the system and implemented in many use cases), a boundary class (used to communicate with the external actors), or a control class (used to handle a specific use case or scenario, typically specialized to only one or a few use cases).

How to Create ECB Diagram in Papyrus

1) Create a papyrus class diagram as discussed in the previous lab. To include the stereotypes of the ECB pattern, click on the right click on the class in the class diagram and go to

Profiles Update profile option



2) Suppose you want to create a class of entity stereotype. Under the update stereotype window, type “entity” in qualified name and enter “ECB” in profile. When you do this, the entity will automatically appear in the stereotype and qualified name will automatically change to "ECB::entity".

Finally, click on + sign beside properties heading and change the name to “name” and value to “entity” and click on ‘Ok’ as shown in the image below:

Update Stereotype

Qualified Name: ECB::entity

Profile: ECB

Stereotype: entity

Class

Properties

name	type	status	member	del...	value
name	String	created	owned	ru...	entity

OK Cancel

You can do similar steps for declaring boundary and control as well.

Design a system for organizing championships of table games.

Requirements:

- A player should register and log in to the system before using it.
- Each registered player may announce a championship.
- Each player is allowed to organize a single championship at a time.
- Players may join (enter) a championship on a web page
- When the sufficient numbers of participants are present, the organizer starts the championship.
- After starting a championship, the system must automatically create the pairings in a round-robin system.
- If the championship is not started yet (e.g. the number of participants does not reach a minimum level), the organizer may cancel the championship
- The actual game is played between existing clients, which is outside the scope of the system.
- Both players should report the result and the moves after each game using a web form. A win scores 1 point, a draw $\frac{1}{2}$, and a loss 0.
- If players report contradicting results, the organizer should judge who is the winner. The organizers penalize the cheating player by a 1 point penalty.
- When all games are finished, the organizer should close the championship by announcing the winner. Then he or she may start organizing a new championship.

A game should be finished within a given deadline (time limit).

- If none of the two players have reported the result within this deadline, then both players are considered to be losers.
- If only one player has reported the result, then his (or her) version is considered to be the official result.

Championship Management USE CASE Diagram

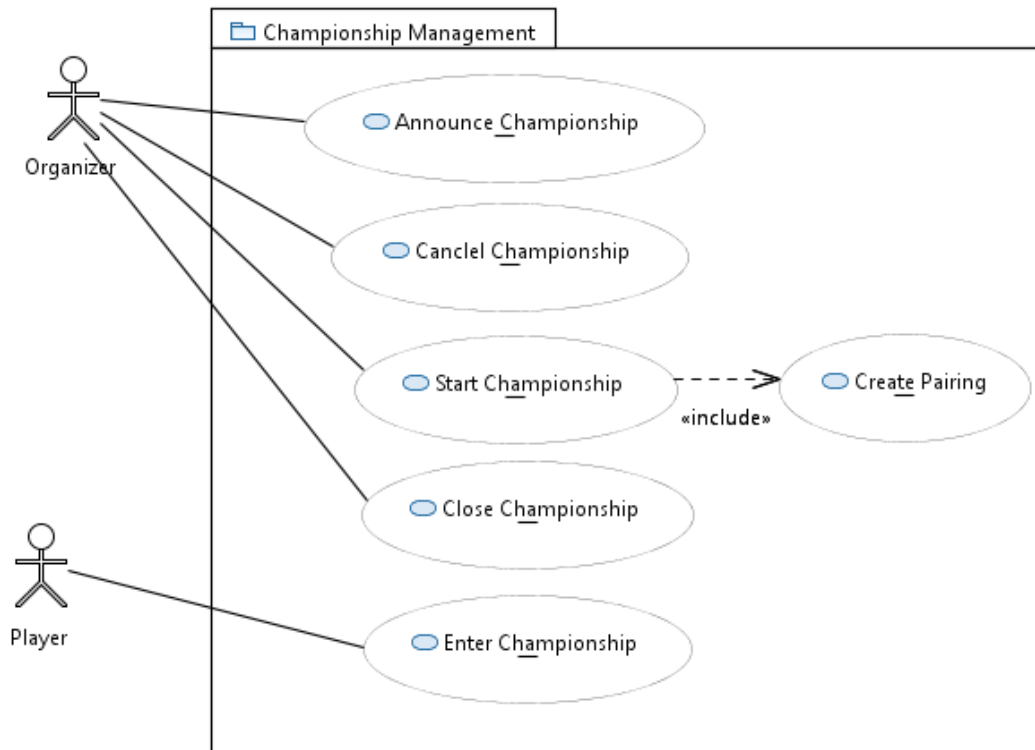


Figure 01

Entity Classes in Championship Management

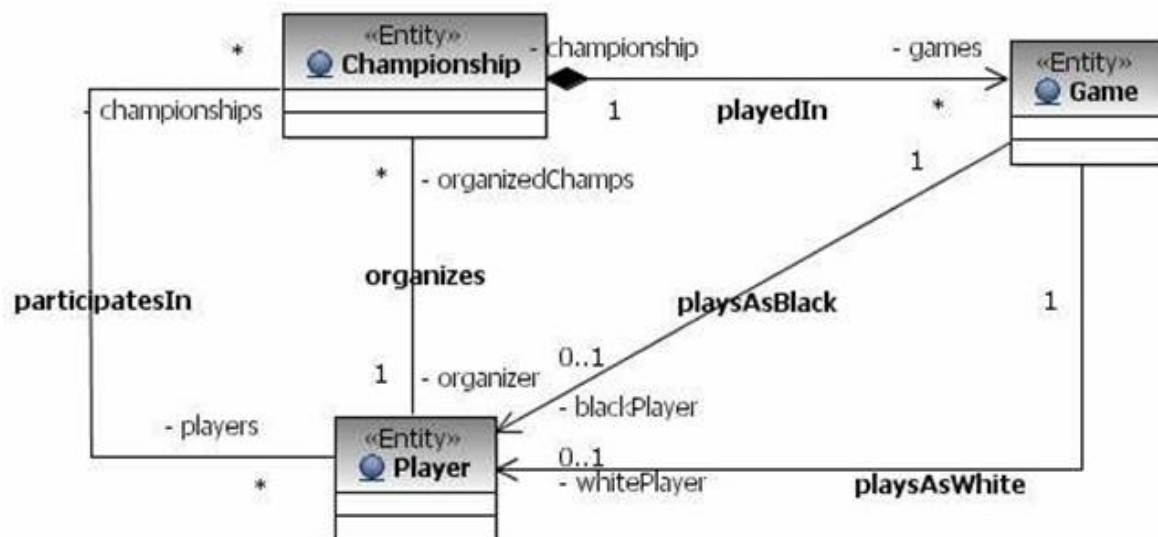


Figure 02

Championship Manager: Control and Boundary Classes

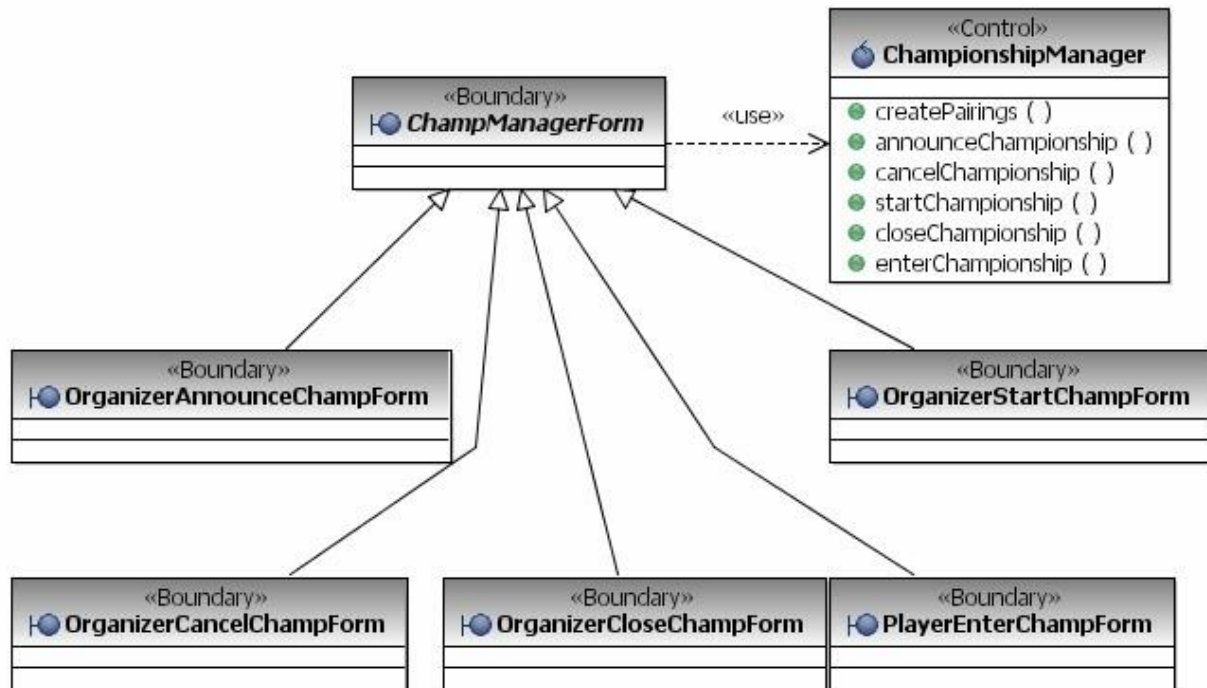


Figure 03

Example 02.ECB Example

Problem Statement: Consider the Administrator/Course Manager, Student, Teacher, Course, Enroll, and User Interface classes. This is part of a university computer system where students add courses from add course UI, drop courses from drop course UI and view catalog from view course UI that are taught by teachers. The Enroll class is used to enroll a student in a class. Identify the entity, boundary, and control classes.

Answer: The entities are the student teacher and course because they represent system data, The User-Interface Classes are the boundary classes because they interact with the user, and finally the Administrator/Course Manager is the control class.

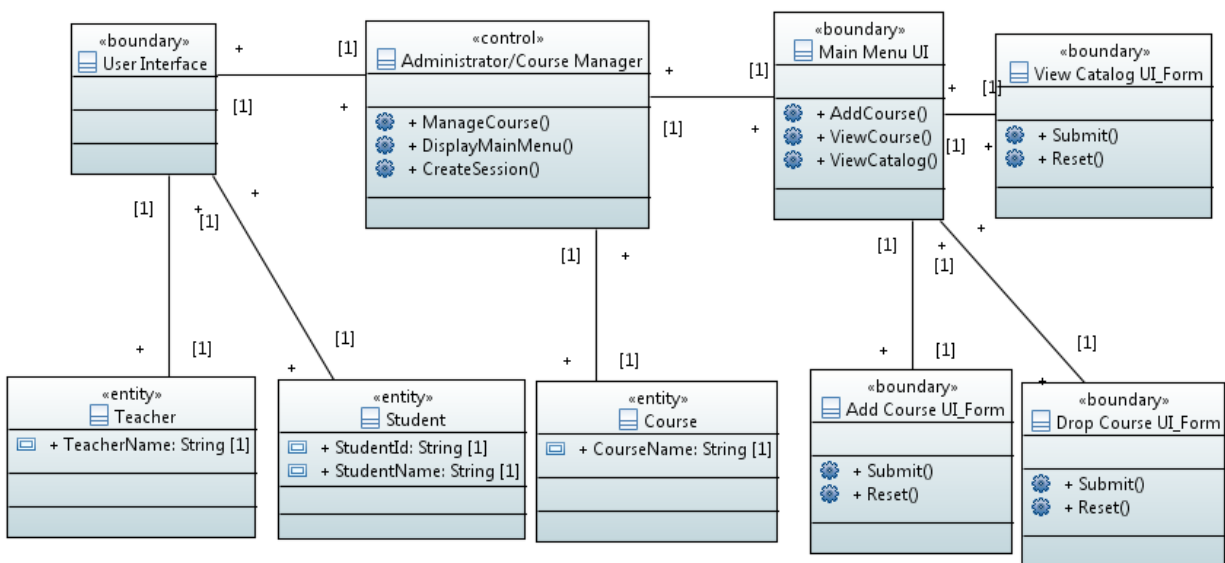


Figure 04

Example 03 Robustness Diagram and Analysis Classes for Search Product USE CASE.

Use case ID	UC001A
Use case name	Search Products
Actors	Customer
Description	Search for products based on some criteria.
Trigger	The customer wants to browse among products or the customer would like to search for certain products.
Precondition	Customer starts a web browser.
Postcondition	Search results meeting the criteria are displayed.
Normal flow	<ol style="list-style-type: none"> 1. Customer visits application home page. 2. Customer clicks Search button. 3. Search page is displayed by the system. 4. Customer enters search criteria. 5. The system validates the criteria provided. 6. The system looks up the catalog to find the products that meet the criteria. 7. Search results page is displayed with the products fulfilling the criteria.
Alternative flows	<p>Refine Search Results</p> <p>The following steps are added:</p> <ol style="list-style-type: none"> 8. Customer refines search results by providing additional criteria. 9. Steps 5–7 are re-executed.
Exceptions	<p>In Step 5, if search criteria is invalid or even missing then Step 3 (display search page) will be executed along with some hints on valid criteria.</p> <p>In Step 6, if no products meet the criteria then Step 3 (display search page) will be executed along with providing the error message "Product not found".</p>
Includes	None
Notes and issues	None

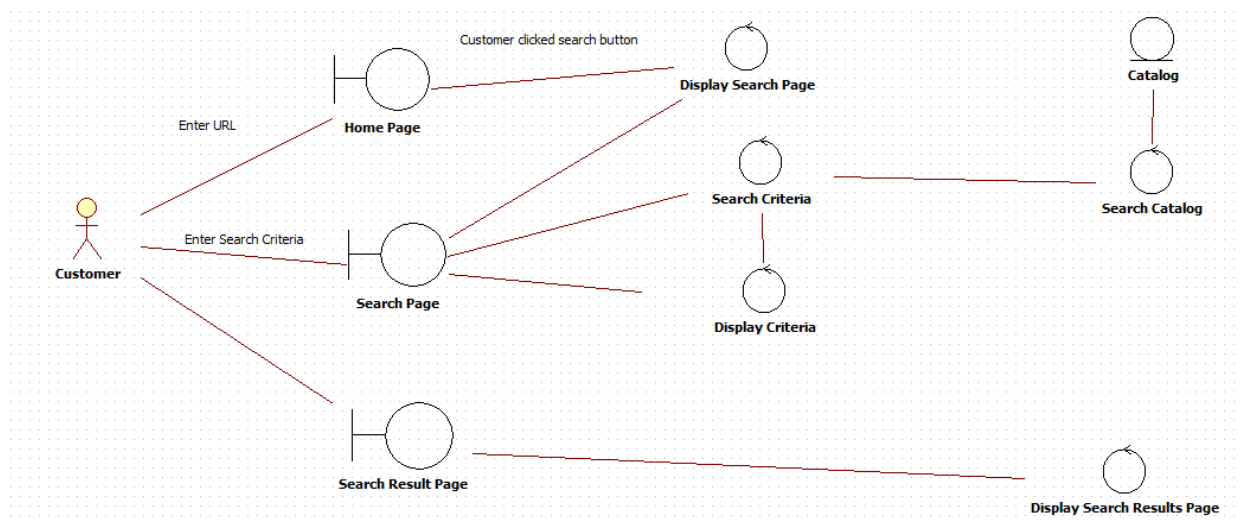


Figure 05

Analysis Classes for **Search Product** USE CASE

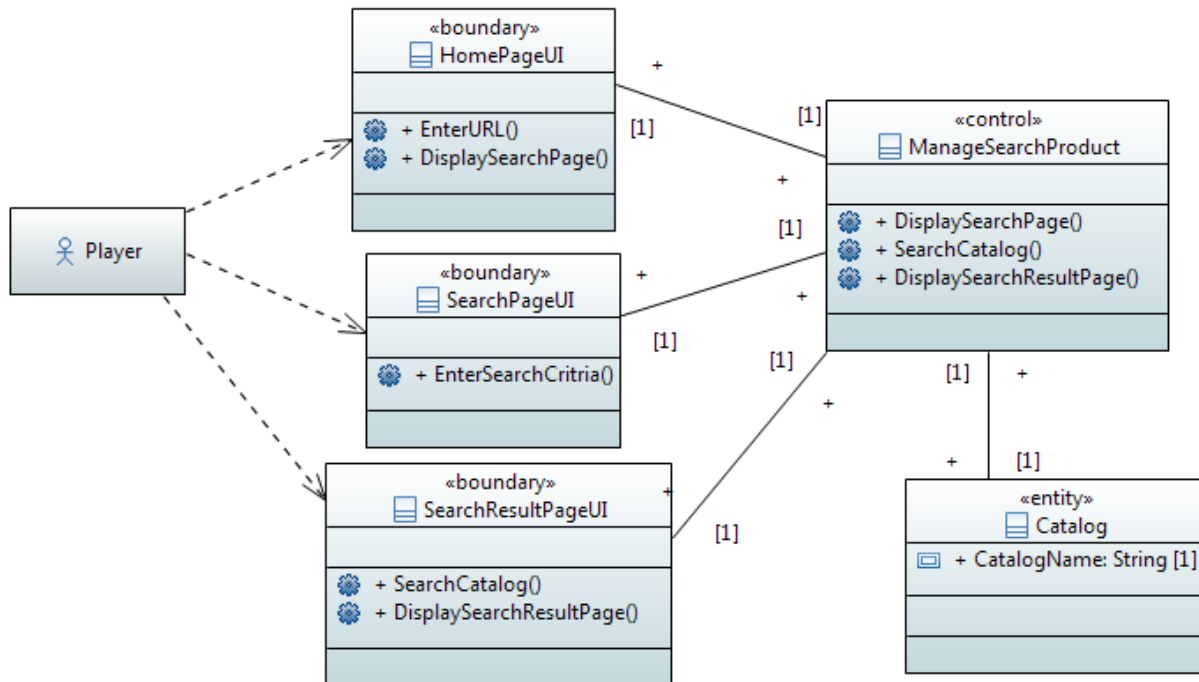


Figure 06

Example 04

The organization offers courses in a variety of areas such as learning management techniques and understanding software languages.

Each course is made up of a set of topics.

Tutors in the organization are assigned courses to teach according to the areas that they specialize in and their availability.

The organization publishes and maintains a calendar of the different courses and the assigns tutors every year.

There is a group of course administrators in the organization who manage the courses including course content, assigning courses to tutors, and defining the course schedule.

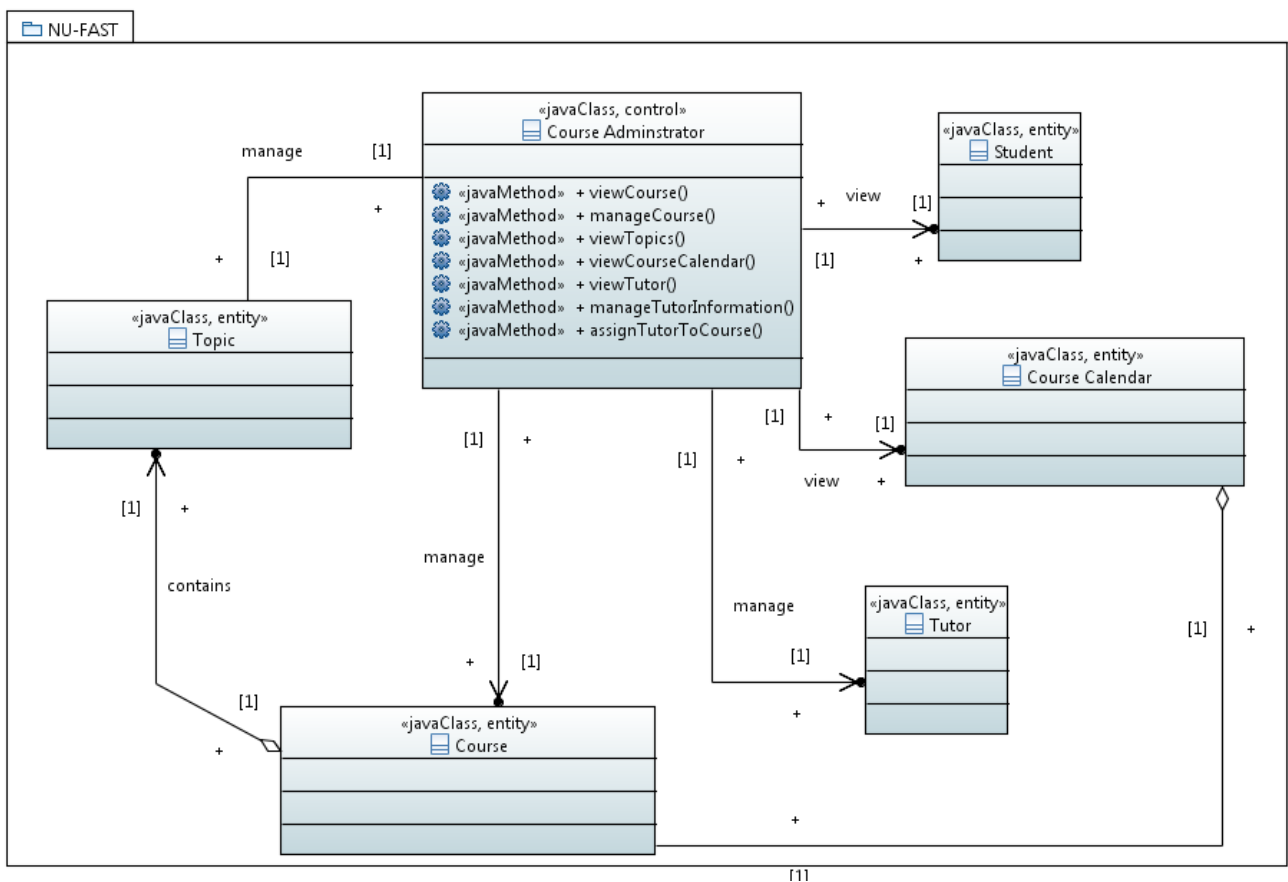


Figure 07