

Chapter 14 Composition (Aggregation)

Reading pp. 860-864

Spring 2018

CS250 - Intro to CS II

Object Requests

- In a class, developers have three ways of dealing with object requests
 - 1. Deal directly with the request by implementing code in a function.
 - Delegate the request to another object. This is known as delegation, composition, or aggregation (one object "has-a" object to perform the request)
 - 3. Let a superclass handle the request through the use of inheritance to be discussed later

Composition / Aggregation

- Use an existing class as a private data member.
- Can you come up with a real world example of composition?

Example

- A book class could contain several members:
 - Title
 - Author
 - Publisher
 - Price
 - Date Published
- What are the types for each of the members?

Composition Advantages

• Objects can be simple in design

More complex objects can easily be made from existing objects (code reusability)

Problem

• We have implemented the ADT Rational.

• In mathematics, we often times want to have a set of something (e.g. the set of real numbers)

• How might we create the ADT RationalSet?

RationalSet ADT Step #1

- Copy the solution (Composition) from the public folder on Grace to your desktop
- Notice that it contains a complete Rational project
- Create a project called RationalSet
- Set up the include, library, and dependency information for the project RationalSet
 - We will do this together. Take Notes



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RationalSet Property Pages		? ×
Configuration: Active(Debug)	V Platform: Active(Win32)	✓ Configuration Manager
▲ Configuration Properties	General	
General	Executable Directories	\$(VC_ExecutablePath_x86);\$(WindowsSDK_ExecutablePath);\$(VS_Exe
Debugging	Include Directories	\$(VC_IncludePath);\$(WindowsSDK_IncludePath);
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▷ C/C++	Library Directories	\$(VC_LibraryPath_x86);\$(WindowsSDK_LibraryPath_x86);\$(NETFXKits
▷ Linker	Library WinRT Directories	\$(WindowsSDK_MetadataPatia);
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XML Document Generator	Exclude Directories	\$(VC_IncludePath);\$(WindowsSDK_IncludePath);\$(MSBuild_Executa

Right Click on Configuration Properties and then VC++ Directories

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We will be adding directory paths to the Include Directories and the Library Directories

Click here and select edit path

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Include Directories	? 🔀
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\$(SolutionDir)\Rational	A
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We are linking to Rational.h, which is located in the directory Rational within the solution directory.

Type:

\$(SolutionDir)\Rational

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Click here and select edit path

Library Directories	? 💌
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	OK Cancel
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We are linking to Rational.obj, which is located in the directory Debug within the directory Rational within the solution directory.

Type:

\$(SolutionDir)\Rational\Debug





Finally, let's check that the dependencies are set correctly. Right click on the solution name and select properties

Select RationalSet here and make sure that the Rational box is checked

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Configuration: N/A	▼ Platform: N/A	 Configuration Manager
Common Properties	Project:	
Startup Project	RationalSet	
Project Dependencies Debug Source Files	Depends on:	
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	Boomshine	
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	Distance	
	Random	
	Rational	
	Rectangle	
		OK Cancel Apply

- For a video on all of this, go to:
 - <u>http://zeus.cs.pacificu.edu/PacificCSVideos/studio2010/r</u> <u>esolvingdependencies.html</u>

RationalSet ADT Step #2

• Create the interface for RationalSet

• What operations do we need for RationalSet?

RationalSet ADT Step #3

• Implement each function one at a time

• Write the driver and test each function

 Note: Do not include any headers that are not necessary in any of the files