



Composition

Spring 2019

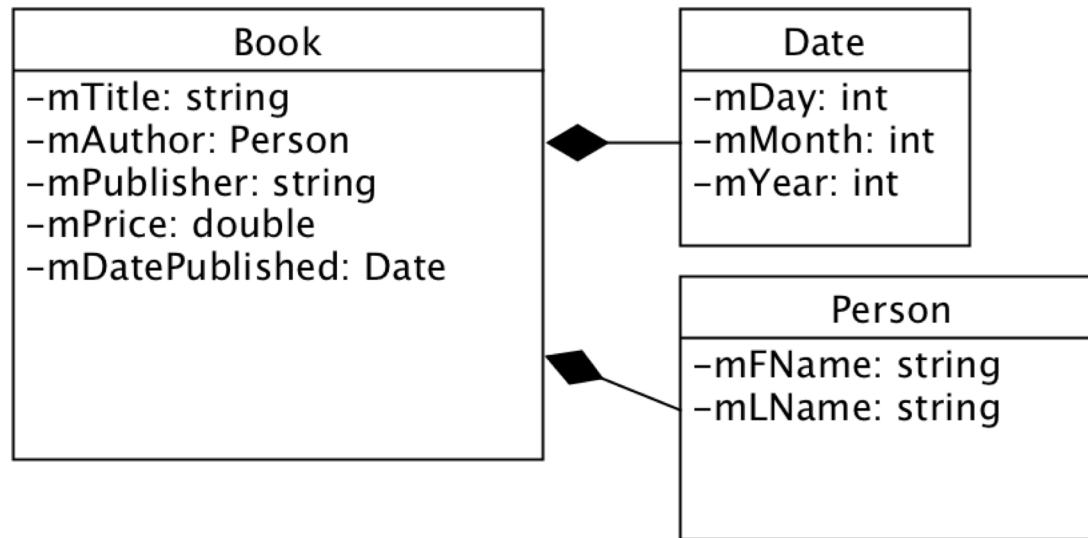
Composition

- 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?

UML



- Composition is shown with a filled in diamond

Composition Advantages

- Objects can be simpler in design
 - *Delegate* work to contained object
- Combine objects to create complex objects
 - code reusability

Problem

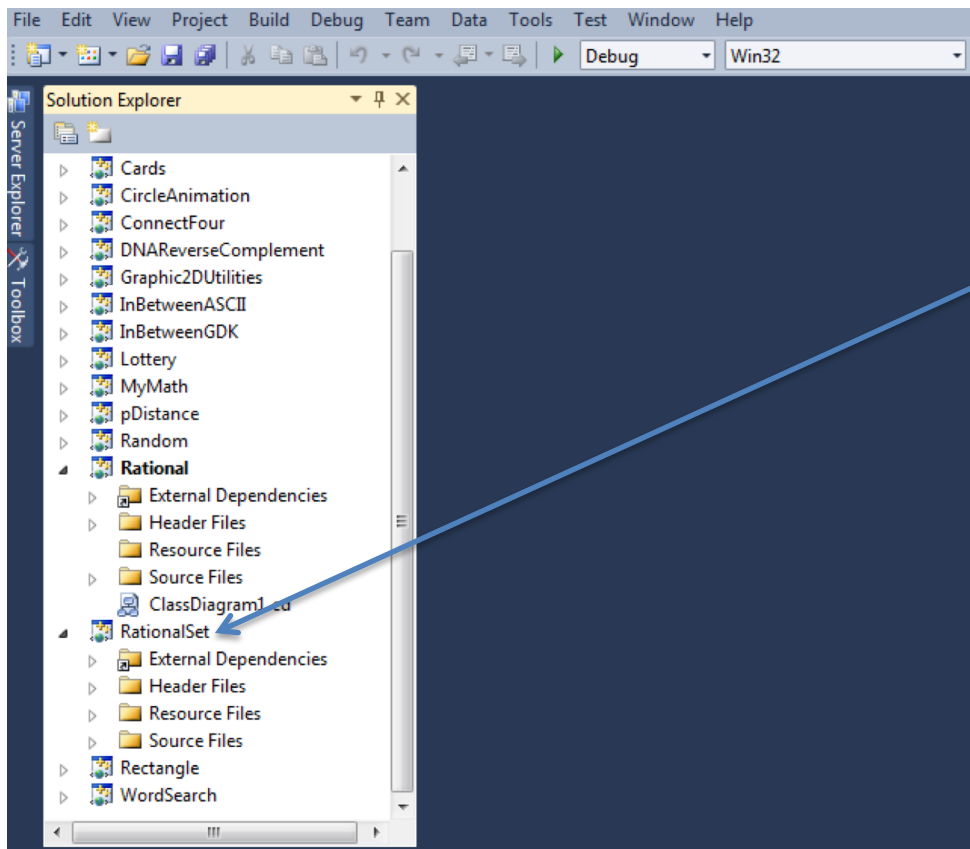
- We have implemented the ADT Rational.
- In mathematics, we often times want to have a set of something (e.g. the set of real numbers)
- How might we create the ADT RationalSet?

Rational ADT

Step #1

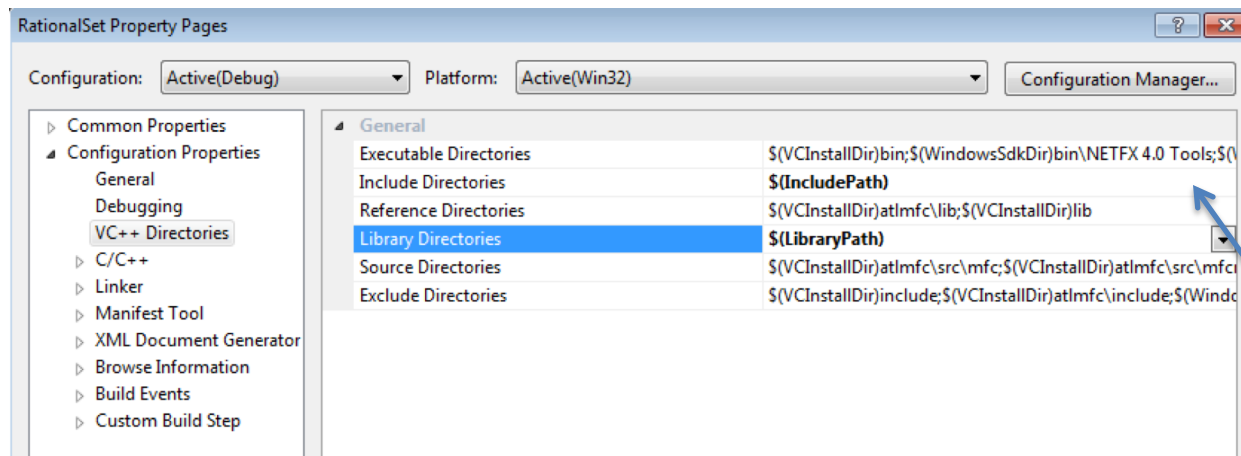
- Copy the solution (Composition) from the public folder on Grace to your desktop
- Notice that it contains a complete Rational project
- Create a project called RationalSet
- Set up the include, library, and dependency information for the project RationalSet
 - We will do this together. Take Notes

Linking Projects



Right click on the project RationalSet and select **properties**

Linking Projects

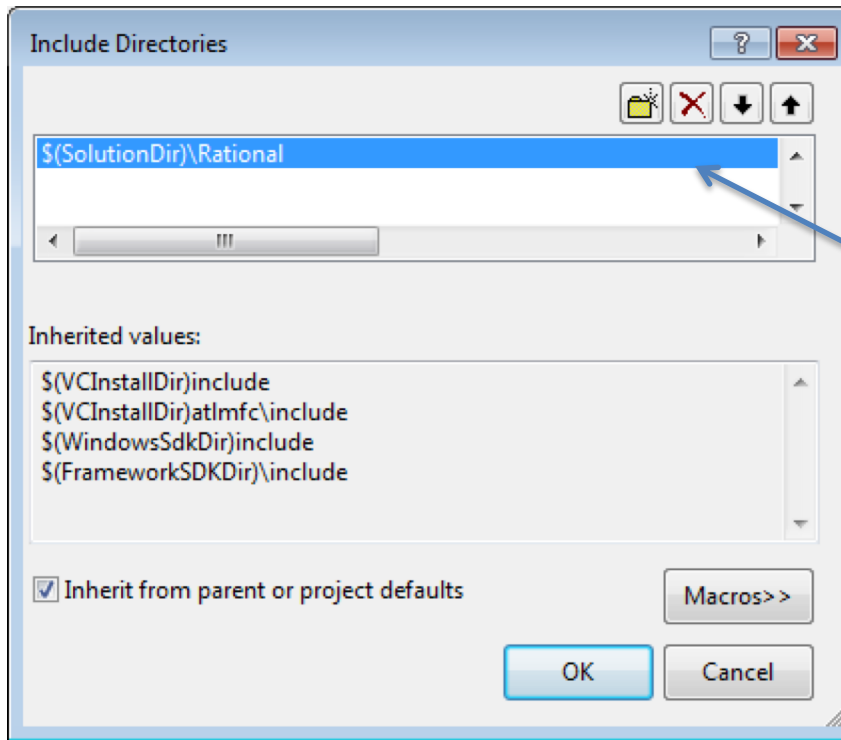


Click on Configuration Properties and then VC++ Directories

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

Click here and select edit path

Linking Projects

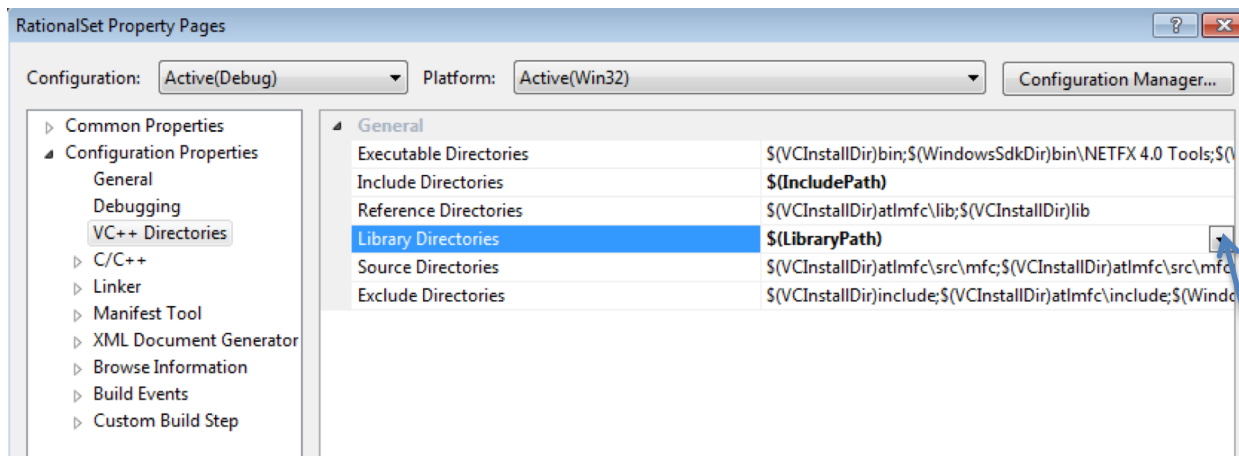


We are linking to Rational.h, which is located in the directory Rational within the solution directory.

Type:

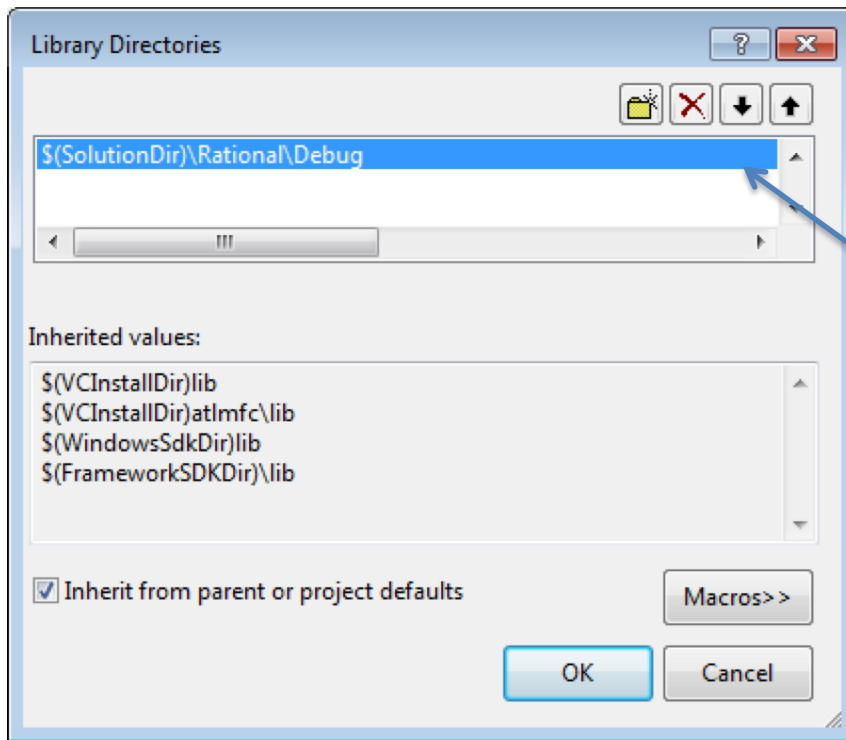
`$(SolutionDir)\Rational`

Linking Projects



Click here and select edit path

Linking Projects

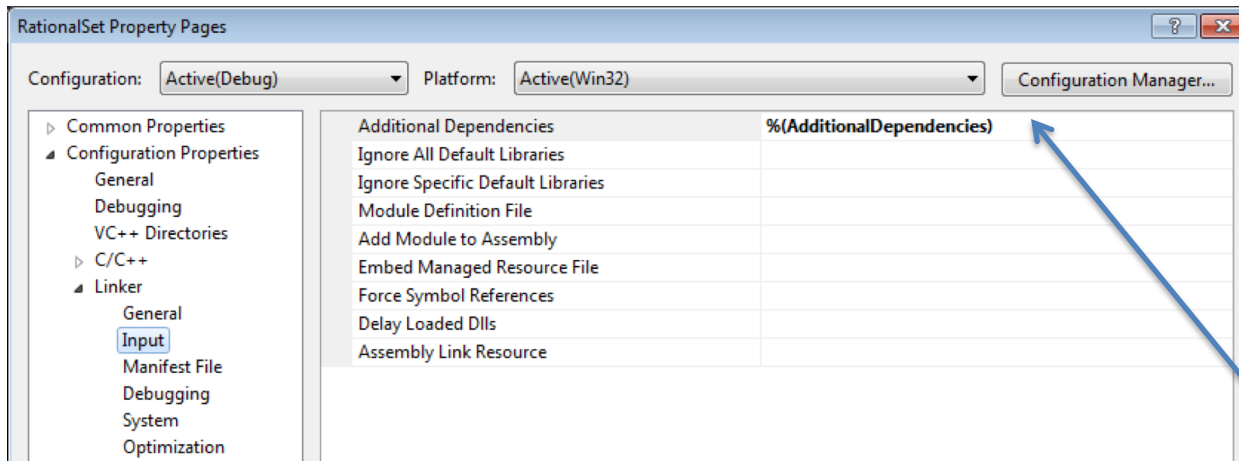


We are linking to Rational.obj, which is located in the directory Debug within the directory Rational within the solution directory.

Type:

`$(SolutionDir)\Rational\Debug`

Linking Projects

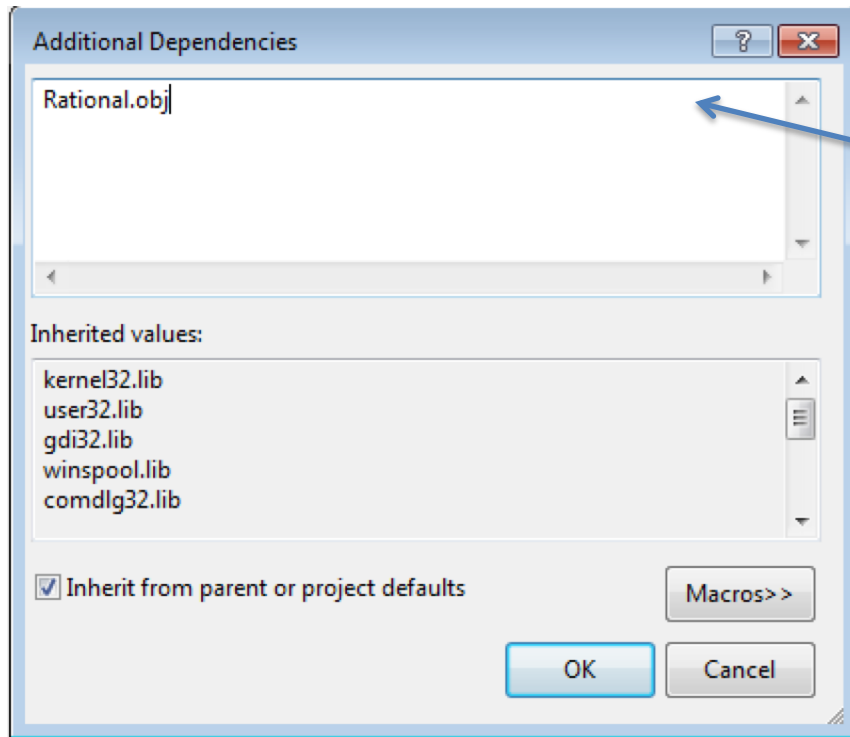


Click on Linker on the left, then go to Input

Here we need to link to the Rational.obj file

Click here

Linking Projects

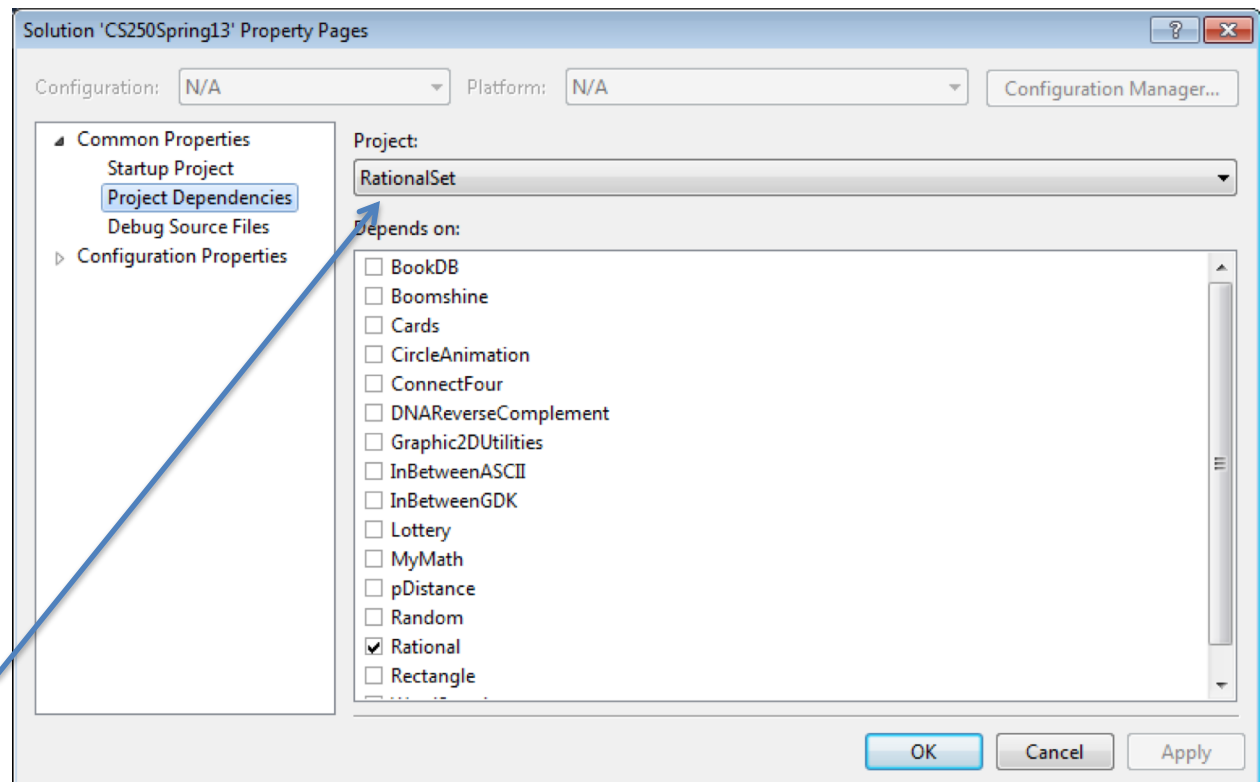


Type:
Rational.obj

Linking Projects

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



Linking Projects

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

Rational ADT

Step #2

- Create the interface for RationalSet
- What operations do we need on RationalSet?

UML for RationalSet

Rational 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