

CS 535 Object-Oriented Programming & Design
Fall Semester, 2008
Doc 18 Heuristics Chapter 4
Nov 23 2010

Copyright ©, All rights reserved. 2010 SDSU & Roger Whitney, 5500
Campanile Drive, San Diego, CA 92182-7700 USA. OpenContent ([http://
www.opencontent.org/openpub/](http://www.opencontent.org/openpub/)) license defines the copyright on this
document.

References

Object-Oriented Design Heuristics, Riel, Addison-Wesley, 1996, Chapter 4

Relationships between Objects

Type	Relation between
Uses	(Object)
Containment	(Object)
Inheritance	(Class)
Association	(Object)

Uses

Object A uses object B if A sends a message to B

Assume that A and B objects of different classes

A is the sender, B is the receiver

Containment

Class A contains class B when A has a field of type B

That is an object of type A will have an object of type B inside it

Heuristics for the Uses Relationship

4.1 Minimize the number of classes with another class collaborates

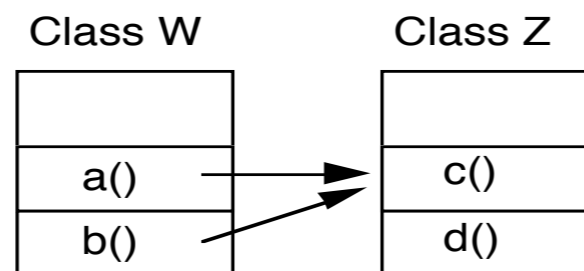
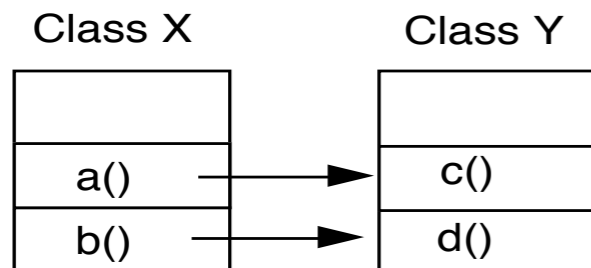
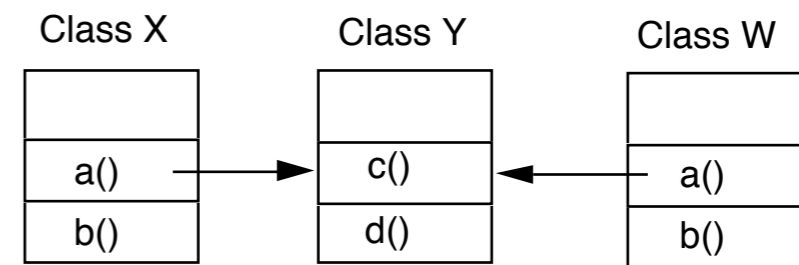
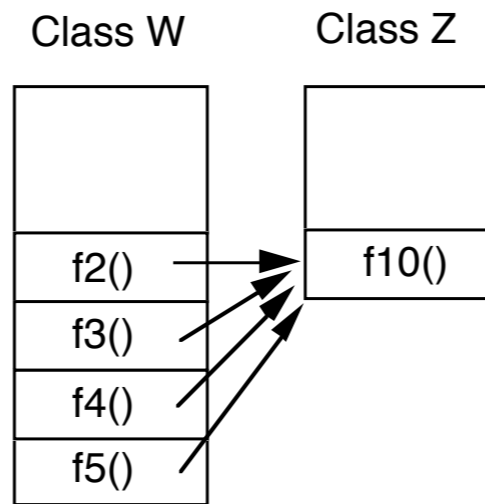
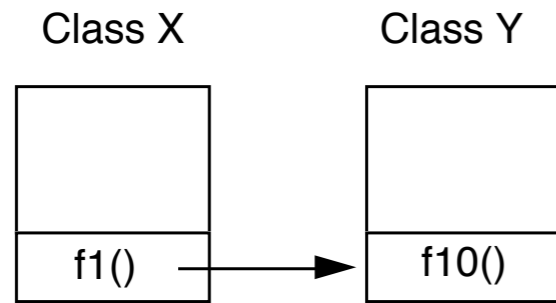


4.2 Minimize the number of message sends between a class and its collaborator

4.3 Minimize the number of different messages a class sends to another class.

4.4 Minimize the product of the number of methods in a class and the number of different messages they send.

Which is more complex?



Containment Relationship

4.5 If class A contains objects of class B, then A should be sending messages to its fields of type B.

This heuristic prohibits:

- Orphaned fields (ones that are never used)

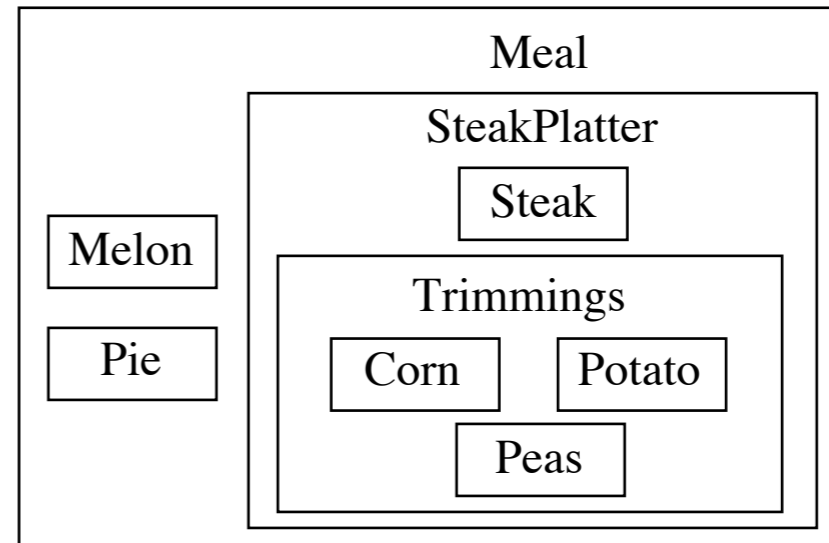
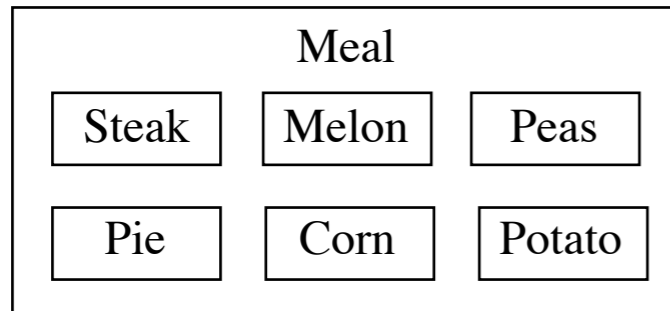
- Fields that are only accessed in get/set methods

- The one exception to 4.5 is container classes

4.6 Most of the methods defined on a class should be using most of the fields in the class most of the time

4.7 Classes should not contain more objects than a developer can fit in his or her short-term memory. A common value for this number is 6

Narrow and Deep Containment Hierarchies

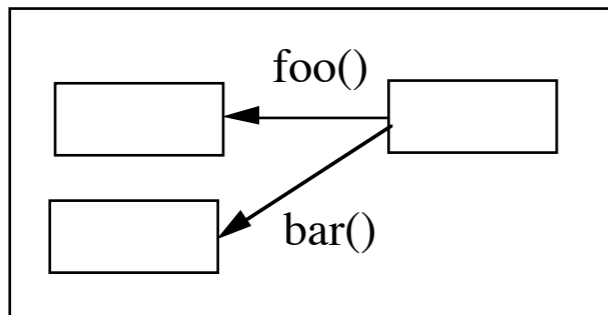


Combining fields into new classes can reduce the number of fields in a class

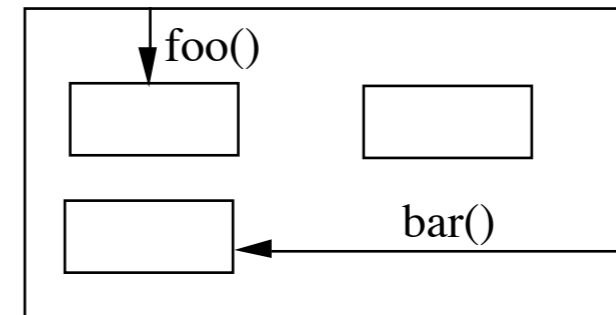
4.8 Distribute system intelligence vertically down narrow and deep containment hierarchies.

No Talking between Fields

4.14 Objects that are contained in the same containing class should not have a uses relationship between them.



Contained Objects with uses relationships



The containing class should send messages to the contained objects

4.13 A class must know what it contains, but it should not know who contains it.

Reuse problem

If A contains B and B uses A

Then B can not be use independent of A

Complexity problem

If A contains B and B uses A

Then A has to work for B to work correctly

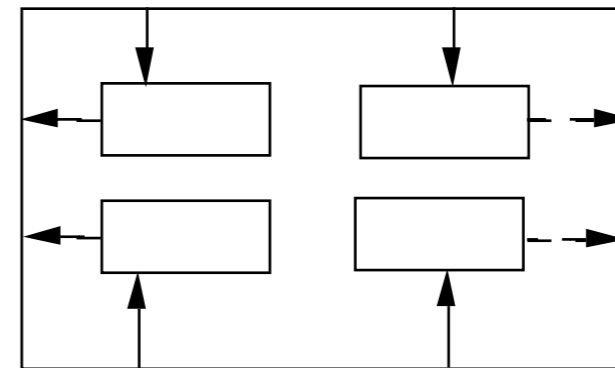
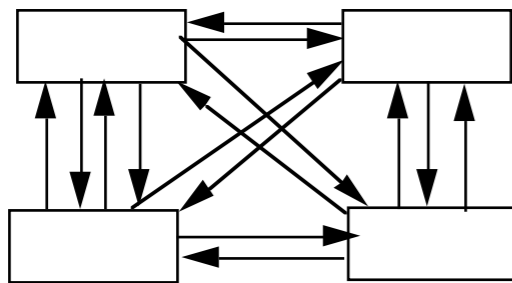
B has to work for A to work correctly

When can Violate 4.13?

If a number of classes depend on each other in a complex way, you can violate 4.13 to reduce the number of classes they interact with.

Wrap the classes in a containing class.

Each contained class sends a message to the containing class, which broadcasts the message to the proper contained objects



What about Ants & the World?