Introducing Objects and Object Oriented Programming

by Andrew Cain and Willem van Straten
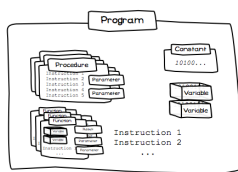
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Object Oriented Programming
Object Oriented Programming in C++

Software Development is about defining instructions for computers
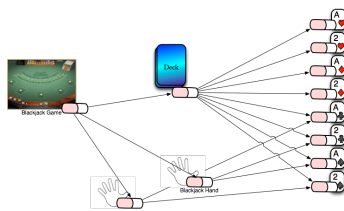
Code — Instructs → CPU
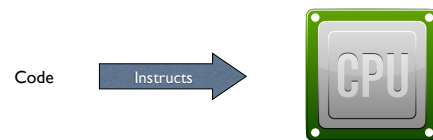
Developers create programs using a range of artefacts to manage complexity

Procedural programming uses functional decomposition, but has limits as size grows
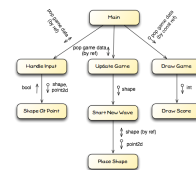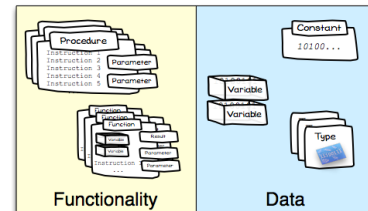

Object oriented programming offers means of managing complexity for larger software
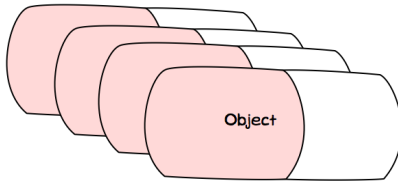

Start to master OO programming by seeing that objects **know** and **do** things

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See the difference between the
Object Oriented Paradigm and the
Procedural Paradigm

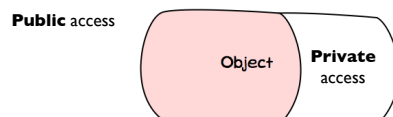Procedural Programming focuses on data
and functionality **separately**

Object oriented programming introduces
higher level artefacts: Objects

Objects **encapsulate** both functionality
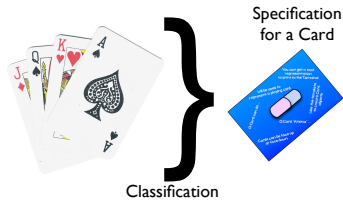and data - they _know_ and can _do_ things

Remember capsules have an "inside" and
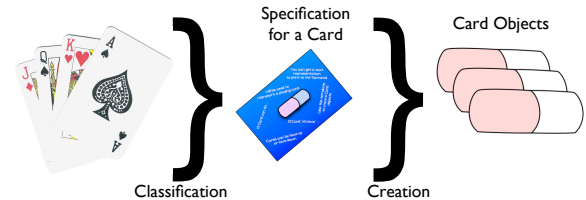"outside" - not everything is accessible

Things the object *knows* and *can do*
can be **hidden** within the object.

Design programs by breaking
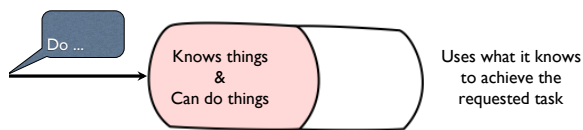problems down into objects

Use **abstraction** to classify objects for your program

Classification

Specification for a Card

Use these classifications to **create objects** at run time

Classification   Creation

Specification for a Card

Card Objects

Tell objects to *do things to* accomplish program goals

Do …

Knows things & Can do things

Uses what it knows to achieve the requested task

Activity - Blackjack classification

Blackjack (also known as 21) is a card game

Players aim for a score higher than the dealer, but no greater than 21.

Each card has a score based on its rank: Aces are either 1 or 11, face cards are 10, other cards have score = rank

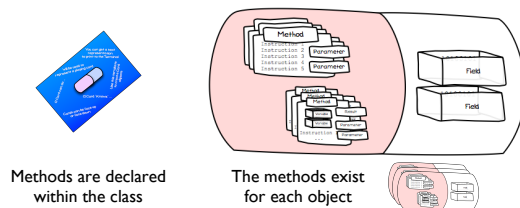Implement your designs using an object oriented programming language

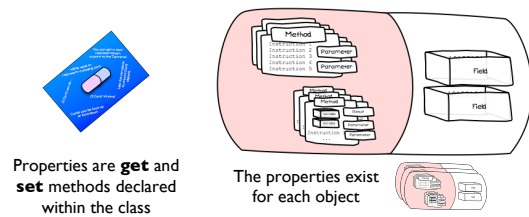In each case, define **classes** to capture object specifications
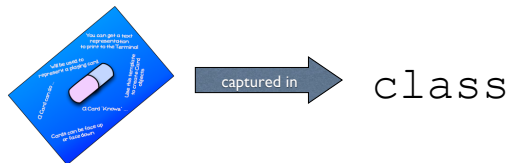
Add private **fields** to the class to store the things the object *knows*


Field are declared within the class

The field exists within each object
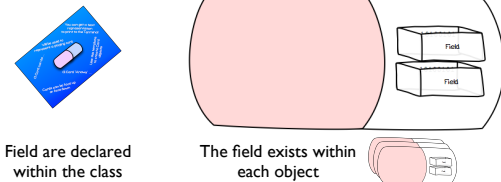
Add **methods** to the class to code the things the object *can do*

Methods are declared within the class

The methods exist for each object

Add **properties** to the class to provide access to hidden data

Properties are **get** and **set** methods declared within the class

The properties exist for each object

Add special methods called **constructors** to initialise your objects when created

Constructors are declared within the class

These define how to create/initialise the objects.
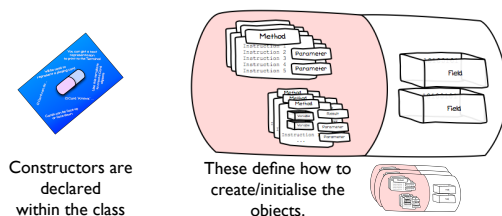
Activity - Card class

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Will you be able to create object oriented programs?

Object orientation offers new means of managing complexity

Start to master the OO language by seeing that objects can **know** and **do** things

Objects combine data and functionality, creating larger more meaningful abstractions

This Week's Tasks

Get started creating object oriented programs

Pass Task 1 - Hello World
Pass Task 2 - Counter
Pass Task 3 - Spells
Pass Task 4 - C# Programming Reference Sheet