

Duck Pond

A duck pond simulator –

- the pond contains a number of ducks from a variety of species
- at each step of the simulation, an action is selected for each duck

Ducks –

- all ducks have an ID unique to each duck
- the species for this version of the sim are mallards, redhead ducks, blue-winged teals, rubber ducks, decoys
 - mallards, redhead ducks, and blue-winged teals fly
 - mallards, redhead ducks, and blue-winged teals swim while rubber ducks and decoys float
 - mallards, redhead ducks, and blue-winged teals quack; rubber ducks squeak; decoys make no noise

Step 1: Textual Analysis to Identify Classes

Pond – contains the ducks

holds the ducks	Duck
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Duck – an individual duck

has an ID	Species
has a species	

Simulator – simulation logic

carries out steps of the simulation	Pond Duck Species
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Species – a kind of duck

has behaviors (fly, swim, float, quack, etc)	
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Mallard	Redhead	...
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Step 2: Apply Design Principles and Patterns

- SRP / one reason to change
 - separate Duck (an individual) and Species (a kind of duck)
- encapsulate what varies / parameterize behavior
 - there's variation in Species...

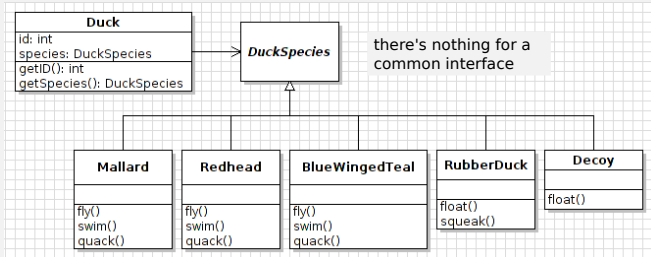
Encapsulating What Varies

- mallards, redhead ducks, and blue-winged teals fly
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common	variable
	which behaviors each species has

Encapsulating What Varies

common	variable
	which behaviors each kind of duck has



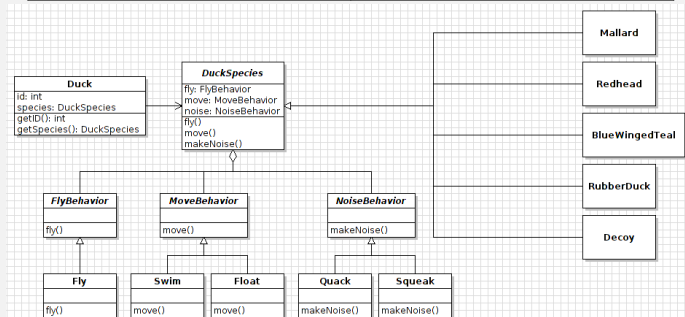
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common	variable
a fly behavior a movement behavior a noise behavior	what each behavior is

Encapsulating What Varies

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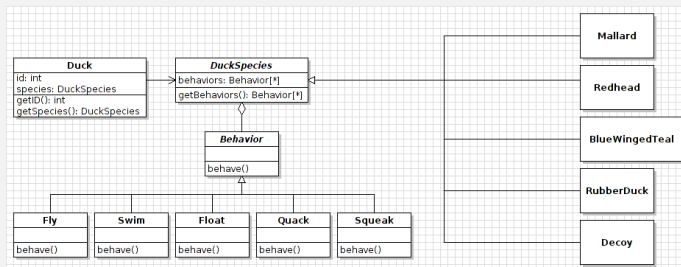
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common	variable
have behaviors	which behaviors

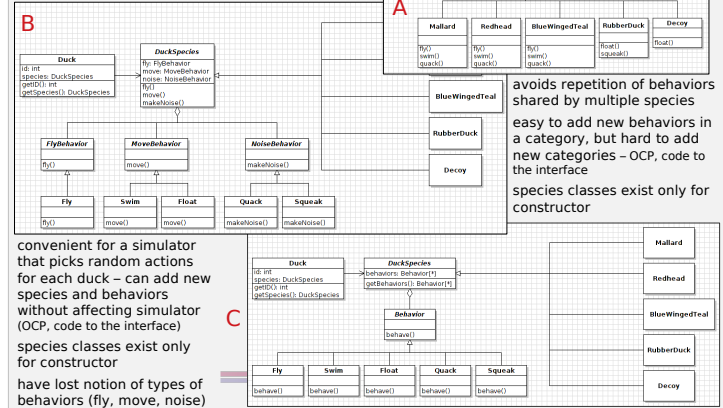
Encapsulating What Varies

common	variable
have behaviors	which behaviors



Encapsulating What Varies

Which design is best?



Encapsulating What Varies

Which design is the best?

It depends –

- how awkward is it to implement the simulator? (due to dependence on specific species and/or actions)
- how likely is it that a new action or new category of action will be added?
- how important is the notion of categories of actions? how bad is it if a species ends up with multiple actions of the same type?