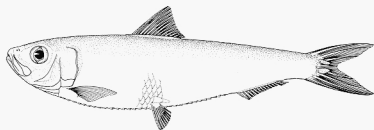# FLR in 15 slides or less

Whitehead, P.J.P., 1985. FAO Species Catalogue.

FAO

Ernesto Jardim
Finlay Scott
European Commission
Joint Research Centre
(JRC)

Outline

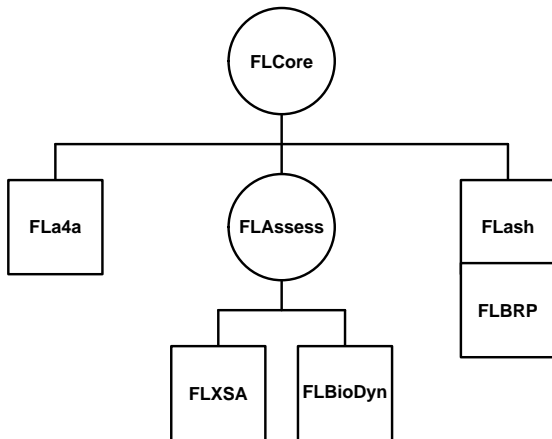FLR ??

FLQuant

FLStock

FLIndex

FLSR

OOP

What is FLR ?

- FLR = Fisheries Libraries in R
- FLR is a set of R packages
- FLR is developed and maintained by a group of fisheries scientists
- FLR is an opensource initiative

A brief history.

- 2005 - 1.0 no one wants to remember this one ...
- 2007 - 1.4 "The golden jackal"
- 2009 - 2.2 "Swordfish Polka"
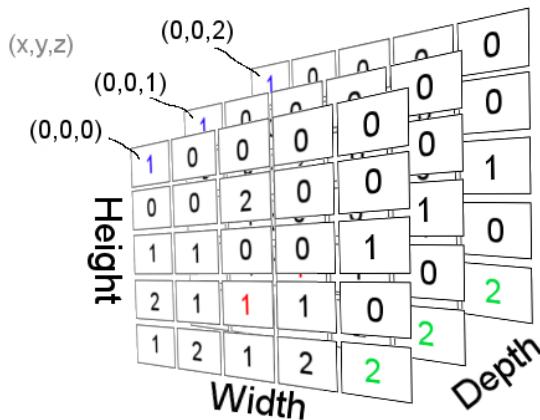- 2011 - 2.4 "The Duke of Prawns"
- 2014? - 2.6 ??

Packages

FLQuant

Stands for "FL quantity" and it's the smallest component of FLR classes.

Six dimensional array used to store data of a particular type (e.g. catch numbers), with the following dimensions:

```
[1] "quant"  "year"   "unit"   "season" "area"   "iter"
```

FLQuant visualization

FLStock

Represents a fish stock and comprises a number of slots.

```
Class "FLStock" [package "FLCore"]

Slots:

Name:           catch       catch.n      catch.wt      discards    discards.n
Class:         FLQuant      FLQuant      FLQuant       FLQuant      FLQuant

Name:      discards.wt     landings    landings.n   landings.wt        stock
Class:         FLQuant      FLQuant      FLQuant       FLQuant      FLQuant

Name:          stock.n      stock.wt            m           mat      harvest
Class:         FLQuant      FLQuant      FLQuant       FLQuant      FLQuant

Name:     harvest.spwn       m.spwn          name          desc        range
Class:         FLQuant      FLQuant    character     character      numeric

Extends:
Class "FLS", directly
Class "FLComp", by class "FLS", distance 2
```

FLIndex

Represents a index (e.g. index of abundance from a survey)
```
Class "FLIndex" [package "FLCore"]

Slots:

Name:            type distribution            index    index.var      catch.n
Class:      character     character          FLQuant      FLQuant      FLQuant

Name:        catch.wt        effort    sel.pattern        index.q         name
Class:        FLQuant       FLQuant        FLQuant        FLQuant    character

Name:            desc         range
Class:      character       numeric

Extends: "FLComp"
```

FLSR

Represents a stock-recruitment relationship and allows the estimation of its parameters.

```
Class "FLSR" [package "FLCore"]

Slots:

Name:          rec          ssb        covar      logerror       model
Class:      FLQuant      FLQuant    FLQuants      logical      formula

Name:         logl          gr distribution      initial       params
Class:    function    function      factor      function        FLPar

Name:       logLik         vcov      hessian      details    residuals
Class:       logLik        array        array         list      FLArray

Name:       fitted         name         desc        range
Class:      FLArray    character    character      numeric

Extends:
Class "FLModel", directly
Class "FLComp", by class "FLModel",          nce 2
```
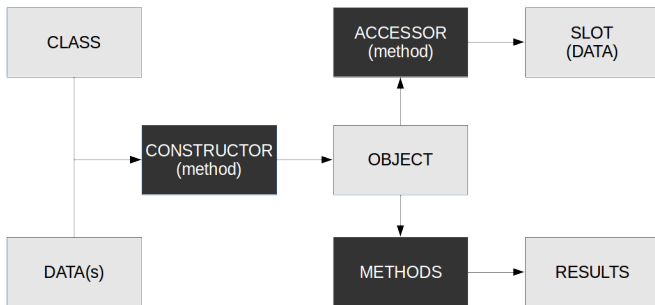
OOP

- OOP = Object Oriented Programming
- A programming language model organized around "objects" rather than "actions"
- R implementation is called "S4"

S4 (OOP in R)

S4	Spreadsheet	Database
class	template	template/class
object	file	instance
slot	sheet	table
method	(macro)	SQL string/ method

FLR & S4

FLR & S4 tips

- Constructors have the same name as the class.
  - FLStock() creates an object of the class "FLStock"
  - FLIndex() creates an object of the class "FLIndex"
- Accessors have the same name as the slot.
  - catch.n() extracts the slot "catch.n" from an object "FLStock"
  - index() extracts the slot "index" from an object "FLIndex"
- Most classes have a set of basic methods
  - plot(), summary(), [, [<-