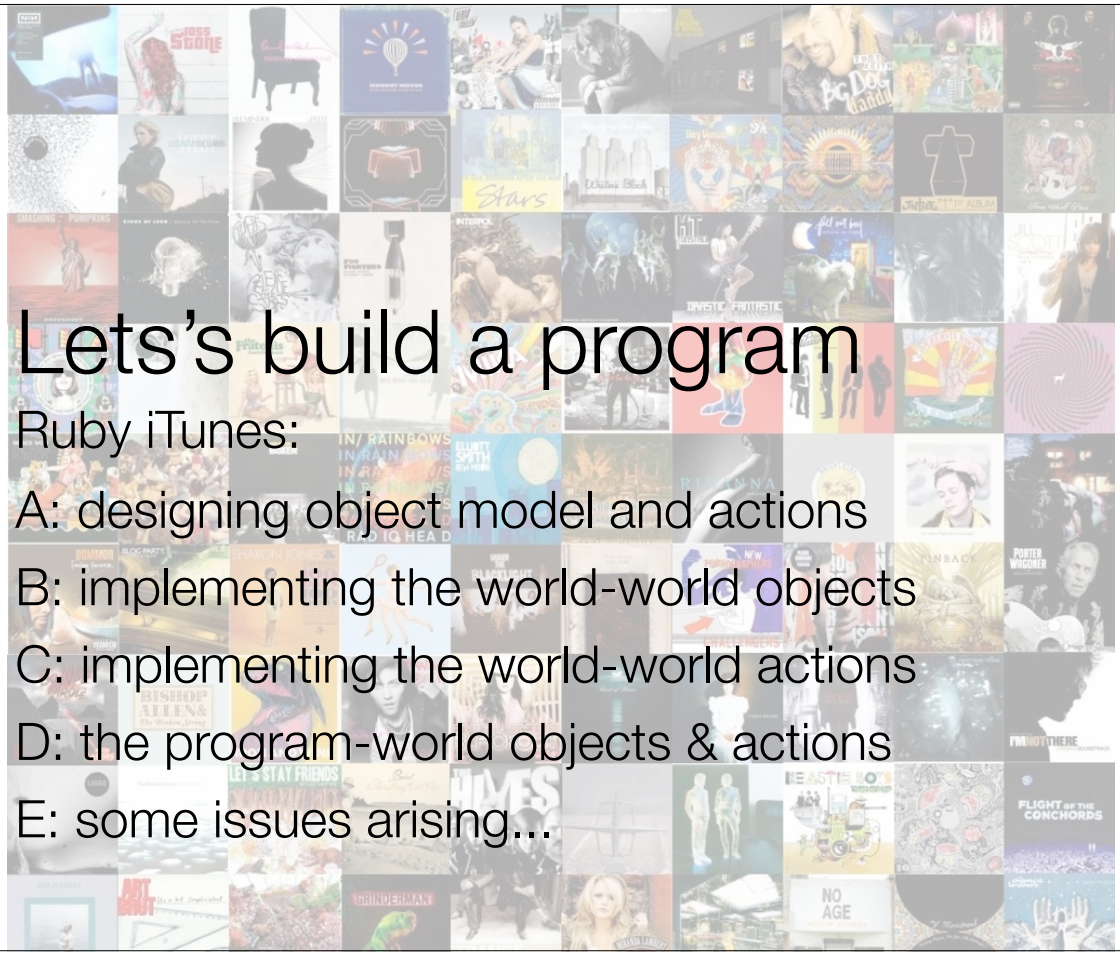
Ruby Explorations IV

Mark Keane...CSI...UCD



Lets's build a program

Ruby iTunes:

A: designing object model and actions

B: implementing the world-world objects

C: implementing the world-world actions

D: the program-world objects & actions

E: some issues arising...

Ruby iTunes

let's create a Ruby based iTunes

it won't actually do anything but we can pretend

later we will use rails to put an interface on it

Part A:

designing the object model and actions

Design: Objects

what is the fundamental object unit ?

the listener, buyer, seller, database, album, artist(s), song, genre, favourites ?

we need to model the music CD world, the program world for handling data, and the buyer-seller world

Some Objects

buyer

library

seller

song

album

owner

utilities

reader

errors

playlist

file

writer

db

Some Actions

in

read

owns

play

write

sell

Jackson System Development (JSD) argued that you model the whole world

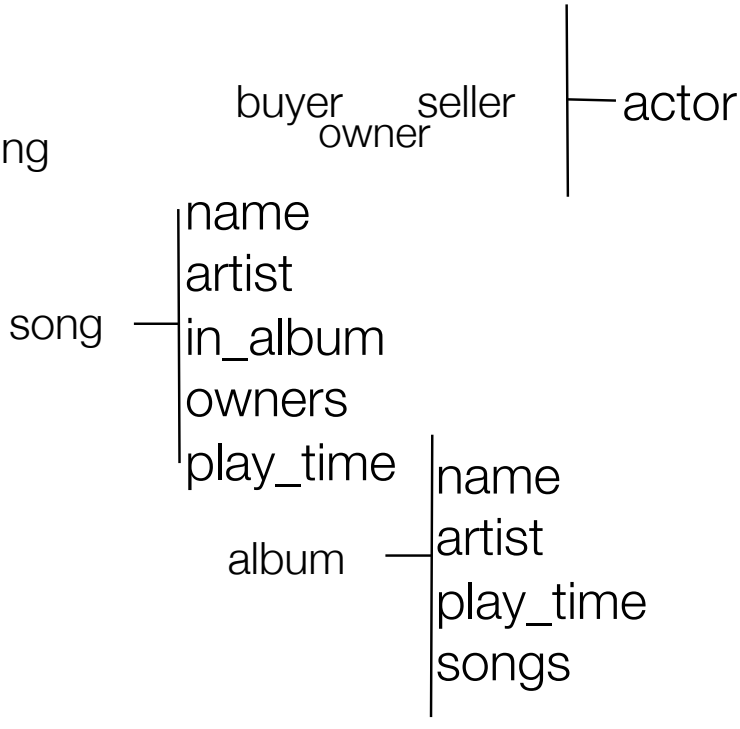
Some Objects Attributes

these are not given, may be inherent or passing

actions might change them

overlapping attributes invite subsumption

are some more fundamental; song, actor



Think of related tables

song
name
artist
album
time
owners
id

album
name
artist
songs
time
owners
id

actor
name
id

buying/selling moves ownership from one actor to another

Design: Fundamentals

the song looks like a good fundamental object

could state its attributes simply as:

:name, :album, :artist, :time, :owners, :id...

we could build an album object from a set of songs, build the songs I own from ownership, could build a greatest hits for an artist, create a back catalogue, and so on

Design: Program Objects/Actions

we have looked at objects & actions in the world-world

there are equally important objects & actions in our program-world; like readers and error-handlers etc...

we will define a few: error objs, reader objs, utility actions and so on

Part B:

implementing the world-world objects

Actor

a standard class with two attributes

actor making method takes 1 args and builds values for 2 attributes

```
class Actor
 attr_accessor :name, :id
 def initialize(name)
     @name = name
     @id = name.object_id
 end
end

p Actor.new(“john”)
```

id made up

actor.rb

```
#<Actor:0x2745c @id=80680,@name="john">
```

Song

```
class Song
 attr_accessor :name, :album, :artist, :time, :owners, :id
 def initialize(name, album, artist, time, owners, id)
     @name = name
     @album = album
     @time = time
     @artist = artist
     @owners = owners
    @id = id
 end
end
```

song.rb

Album

```
class Album
 attr_accessor :name, :tracks, :length, :artist, :id
 def initialize(name, tracks, length, artist, owners)
     @name = name
     @tracks = tracks
     @length = length
     @artist = artist
      @owners = owners
     @id = name.object_id
 end
end
```

id made up

album.rb

Part C:

implementing the world-world methods

Comment

we need to be able to look at the objects

we need to be able to play a song and buy it

we need to be able to create albums
from collections of songs

for now...lets not worry where they come from

```
class Song
 attr_accessor :name, :album, :artist, :time, :owners, :id
 def initialize(name, album, artist, time, owners, id)
     @name = name
     @album = album
     @time = time
     @artist = artist
     @owners = owners
    @id = id
 end

 def to_s
     puts "<< #{@name} >> by #{@artist} in their album
           #{@album} is owed by #{@owners} .\n"
 end

 def isa?
     instance_of?(Song)
 end

 def play_song
     no = rand(10)
     no.times {print "#{@name} do be do..."}
     puts "\n"
 end

end
```

song.rb

```
class Song
 attr_accessor :name, :album, :artist, :time, :owners, :id
 def initialize(name, album, artist, time, owners, id)
     @name = name
     @album = album
     @time = time
     @artist = artist
     @owners = owners
    @id = id
 end

 def to_s
     puts "<< #{@name} >> by #{@artist} in their album
           #{@album} is owed by #{@owners} .\n"
 end

 def isa?
     instance_of?(Song)
 end

 def play_song
     no = rand(10)
     no.times {print "#{@name} do be do..."}
     puts "\n"
 end

end
```

print out

crappy predicate

ah..come on !

song.rb

```
class Album
 attr_accessor :name, :tracks, :length, :artist,:owners,:id
 def initialize(name, tracks, length, artist, owners)
     @name = name
     @tracks = tracks
     @length = length
     @artist = artist
     @owners = owners
     @id = name.object_id
 end

 def to_s
     puts "The album #{@name} by #{@artist}. \n"
 end

 def isa?
     instance_of?(Album)
 end

 def self.make_album(name,tracks, length, artist, owners)
     Album.new(name, tracks, length, artist, owners)
 end

 def self.build_all(albums = [])
    ….
 end

 def self.build_an_album_called(album_name)
     …
 end
```

print out

instance creator

class method

album.rb

Aside: **Uniq**

```
>> foo = ["a","b","a1","c","b",
"b", "c", "a"]
=> ["a", "b", "a1", "c", "b",
"b", "c", "a"]
>> foo.uniq
=> ["a", "b", "a1", "c"]
```

uniq

uniq!

```
>> foo
=> ["a", "b", "a1", "c", "b",
"b", "c", "a"]
>> foo.uniq!
=> ["a", "b", "a1", "c"]
>> foo
=> ["a", "b", "a1", "c"]
```

Aside: **Join**

```
>> foo = ["a","b","a1","c","b",
"b", "c", "a"]
=> ["a", "b", "a1", "c", "b",
"b", "c", "a"]
>> foo.join
=> "aba1cbbca"
```

join

```
>> foo
=> ["a", "b", "a1", "c", "b",
"b", "c", "a"]
>> foo.join(“ “)
=> “a b a1 c b b c a"
```

Aside: **SPLIT**

```
>> foo = ["a","b","a1","c","b",
"b", "c", "a"]
=> ["a", "b", "a1", "c", "b",
"b", "c", "a"]
>> x = foo.join
=> "aba1cbbca"
>> x.split
=> ["aba1cbbca"]
>> x.split(/b/)
=> ["a", "a1c", "", “ca"]
>> x
=> "aba1cbbca"
```

Aside: **inject**

```
> foo
=> ["a", "b", "a1", "c"]
>> foo.inject {|a,b| a + b}
=> "aba1c"
>> [1,2,3,4,5].inject {|a,b| a + b}
=> 15
>> foo.inject {|a,b| [a,b]}
=> [["a", "b"], "a1"], "c"]
```

inject applies a block to an array, take pair-wise elements , evaluates them and then passes the value as the 1st part of the next pairwise comparison

Aside: **ObjectSpace**

```
ruby_engine
#<RubyVM::InstructionSequence:0x815934>
default_user_source_cache_dir
#<RubyVM::InstructionSequence:0x8159fc>
default_system_source_cache_dir
#<RubyVM::InstructionSequence:0x815a88>
default_bindir
#<RubyVM::InstructionSequence:0x815b64>
rescue in default_exec_format
#<RubyVM::InstructionSequence:0x815bdc>
default_exec_format
#<RubyVM::InstructionSequence:0x815c7c>
default_path
#<RubyVM::InstructionSequence:0x815d6c>
user_dir
#<RubyVM::InstructionSequence:0x815f38>
default_dir
#<RubyVM::InstructionSequence:0x815fb0>
default_sources
#<RubyVM::InstructionSequence:0x816028>
ensure_gem_subdirectories
#<RubyVM::InstructionSequence:0x81617c>
block in set_paths
#<RubyVM::InstructionSequence:0x8161f4>
set_paths
#<RubyVM::InstructionSequence:0x816280>
set_home
#<RubyVM::InstructionSequence:0x8162f8>
pre_uninstall
#<RubyVM::InstructionSequence:0x816370>
pre_install
#<RubyVM::InstructionSequence:0x8163e8>
post_uninstall
#<RubyVM::InstructionSequence:0x816460>
post_install
#<RubyVM::InstructionSequence:0x816550>
path
#<RubyVM::InstructionSequence:0x816604>
dir
#<RubyVM::InstructionSequence:0x8167a8>
gem
  end
Album
Album
@d
block in update_album
              '.%0*d' % [n, (sec_fraction / Rational(1,
10**n)).round]
valid_time?
            else
new_version
current_version
              ''
valid_nth_kday?
#<RubyVM::InstructionSequence:0x818904>
block in update_album
            if n < 1
dash
    strftime('T%T' +
gem_directory_name
valid_weeknum?
iso8601_timediv
  def iso8601_timediv(n) # :nodoc:
gems_directory
#<RubyVM::InstructionSequence:0x818d14>
block in update_album
push_all_highest_version_gems_on_load_path
valid_commercial?

valid_date?
  end
n
numbers
#<RubyVM::InstructionSequence:0x819174>
block in update_album
gem_version
valid_civil?
#<RubyVM::InstructionSequence:0x819318>
    super(str, fmt)
update_album
/opt/local/lib/ruby1.9/1.9.1/date.rb
/opt/local/lib/ruby1.9/1.9.1/date.rb
valid_ordinal?
required_version
date
#<RubyVM::InstructionSequence:0x819624>
make_album
date
  def self._strptime(str, fmt='%FT%T%z')
calculate_integers_for_gem_version
```

Aside: **ObjectSpace**

```
class Beno
      def hi
        puts "hi beno"
      end
end

p a = Beno.new
p b = Beno.new
p c = Beno.new
contents_a=  ObjectSpace.each_object(Beno)
p contents_a
contents_b =  ObjectSpace.each_object(Beno).to_a
p contents_b
```

returns enumerator

returns array

a_beno.rb

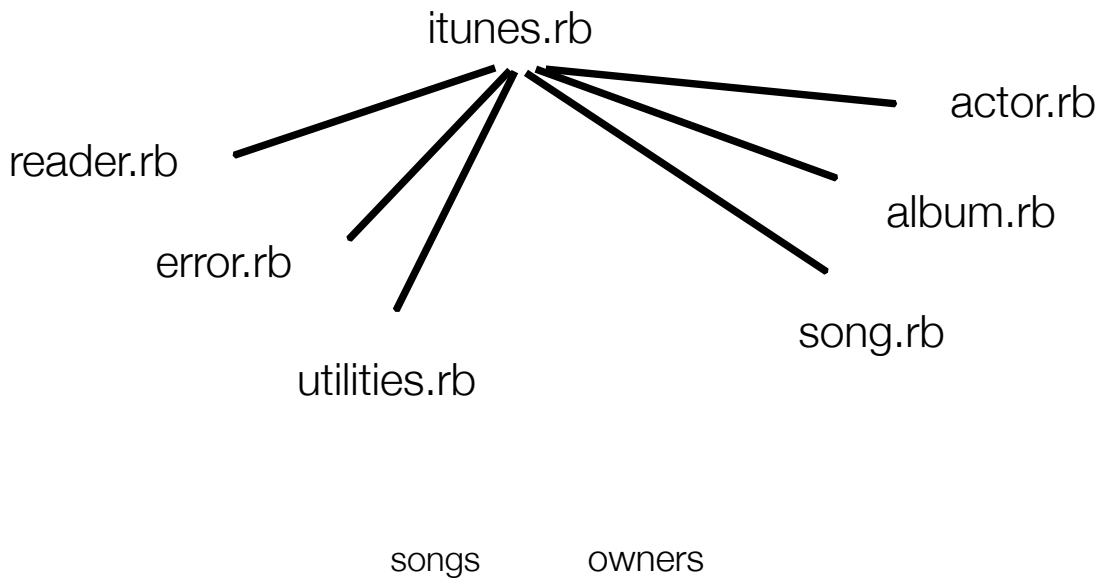
```
# NB. Ruby1.8 and ruby2.0 act differently; 1.8 throws an error

ruby  a_beno.rb
#<Beno:0x113b7c>
#<Beno:0x113b68>
#<Beno:0x113b54>
#<Enumerator: ObjectSpace:each_object(Beno)>
[#<Beno:0x113b54>, #<Beno:0x113b68>, #<Beno:0x113b7c>]
```

to_a converts a subclass of an array into an array

Part D:

the program-world objects & methods



```
require 'csv'
require_relative 'actor','album','song','reader','utilities', 'error'

#songs_file = ARGV[0]
#owners_file = ARGV[1]
reader = Reader.new
songs_file = 'songs.csv'              #in RubyMine
owners_file = 'owners.csv'            #in RubyMine

puts "\nProcessing Songs from file: #{songs_file}"
$songs = reader.read_in_songs(songs_file)

puts "Processing Ownership from file: #{owners_file}"
$hash_owners = reader.read_in_ownership(owners_file)

puts "Building all owners..."
$actors = Actor.build_all()

puts "Updating songs with ownership details..."
$songs.each{|song| song.owners = $hash_owners[song.id]}

puts "Building All Albums..."
$albums = Album.build_all()

# markkean% ruby itunes.rb songs.csv owners.csv
```

instance of reader

#for command line
#for command line

Top-level

itunes.rb

ARGV[0] ARGV[1]

Error

```
class MyErr
 attr_accessor :type, :holder, :method
 def initialize(type, holder, method)
     @type = type
     @holder = holder
     @method = method
 end

 def do_it
     if @type == "multiple_answer_error"
         then puts "Error: Item #{@holder} raised #{@type} in #{@method}"
     elsif @type == "not_found_error"
         then puts "Error: #{@holder} was #{@type} in #{@method}"
     else puts "Error: Have been given an unknown error type: #{@type}"
     end
 end

end
```

error.rb

Utilities

```
module Util
   def self.fetch(string_item, out = [])
       all = $songs + $actors + $albums
      found = all.select{|obj| string_item == obj.name}
       if found.size == 0
         then MyErr.new("not_found_error", string_item, "fetch").do_it
       elsif   found.size > 1
         then  MyErr.new("multiple_answer_error", string_item, "fetch").do_it
       elsif  found.size == 1
         then   found.first
       end
   end
end


class Array
  def clean_up()
    self.join(" ").split(" ").uniq   #this could be more elegant
  end
end
```

utilities.rb

its not pretty but, hey, it works

Aside: **downcase**

```
>> "Cats and Jammers RULE !!!".downcase
=> "cats and jammers rule !!!"

>> "let me shout to you".upcase
=> "LET ME SHOUT TO YOU"

>> "ruth, let me capitalise you".capitalize
=> "Ruth, let me capitalise you"

>> "but we are all small already".downcase
=> "but we are all small already"

>> "AND WE ARE ALL LARGE".upcase
=> "AND WE ARE ALL LARGE"
```

Aside: **when**

may finish with **else**

when *test true do_next line*

```
def sheep_spotter(test)
  case
    when test == "sheep"
      puts "Yup, its a sheep alright."
    when test == "wolf"
      puts "No, this is a wolf."
    when test.instance_of?(String)
      puts "I really don't know what this is?"
    else "Are you trying to poison me!"
   end
end

p sheep_spotter(nil)
p sheep_spotter("sheep")
p sheep_spotter("wolf")
p sheep_spotter("elf with a ham")
```

a_wheno.rb

why the nils

```
$ ruby a_wheno.rb
 "Are you trying to poison me !"
 Yup, its a sheep alright.
 nil
 No, this is a wolf.
 nil
 I really don't know what this is?
 nil
$
```

csv.files I

row headers

with comments

```
"Songname","Artist","Album","Time","Id"
# THIS FILE CONTAINS ALL SONGS IN iTunes
# Aug 29 2014
# Plastic Beach by Gorillaz
"Superfast Jellyfish","Gorillaz","Plastic Beach",2.55,10
"On Melancholy Hill","Gorillaz","Plastic Beach",3.54,11
"Broken","Gorillaz","Plastic Beach”,3.17,12
# I Had the Blues and I Shook Them Loose by  Bombay Bicycle Club
"Always Like This","Bombay Bicycle Club","I Had the Blues and I Shook Them
Loose",4.06,13
# Horehound by The Dead Weather
"60 Feet Tall","The Dead Weather","Horehound",5.33,14
"I Cut Like a Buffalo","The Dead Weather","Horehound",3.28,15
"So Far From Your Weapon","The Dead Weather","Horehound",3.40,16
# Straight in No Kissing by  Dirty Epics
"Way Too Pretty","Dirty Epics","Straight in No Kissing",3.19,17
"Pony","Dirty Epics","Straight in No Kissing",3.14,18
"The Cure","Dirty Epics","Straight in No Kissing",2.96,19
# Crystal Castles by  Crystal Castles
"Untrust Us","Crystal Castles","Crystal Castles",3.06,20
"Air War","Crystal Castles","Crystal Castles",4.02,21
#
# Disco Crap  by  Multiple Artists
"Staying Alive","The GBs","Disco Crap",3.06,22
"Staying Alive","The GBs","Disco Crap",3.06,23
"Bling","SalboNedam","Disco Crap",4.02,24
```

a

songs.scv

csv.files II

- quick way of recording who owns what
- pick up id from songs.csv
- both are read in to build objects by reader.rb

row headers

with comments

```
"Songid","Libraries"
# File has Mapping from Song-Ids to Owners
# Aug 30 2014
##############################################
#           All SONGS
##############################################
10,"apple markk stinkypig"
11,"apple markk stinkypig"
12,"apple markk stinkypig"
13,"apple markk"
14,"apple markk"
15,"apple markk"
16,"apple markk"
17,"apple markk"
18,"apple markk stinkypig"
19,"apple"
20,"apple"
21,"apple"
22,"apple"
23,"apple"
24,"apple"
```

owners.csv

```
class Reader

 def read_in_songs(csv_file_name)
   songs = []
   CSV.foreach(csv_file_name, :headers => true) do |row|
      songname, artist, album, time, id = row[0],row[1], row[2], row[3], row[4]
      unless (songname =~ /#/)
          songs << Song.new(songname,album,artist,time.to_f,nil,id)
      end
    end
   songs
 end


 def read_in_ownership(csv_file_name, temp_hash = Hash.new)
   CSV.foreach(csv_file_name, :headers => true) do |row|
       song_id, owner_data = row[0], row[1]
       unless (song_id =~ /#/)
              temp_hash[song_id] = owner_data
           end
    end
    temp_hash
 end
end
```

reader.rb

```
# READER
# Copyright Mark Keane, All Rights Reserved, 2014

class Reader
 #read in the songs
 def read_in_songs(csv_file_name)
   songs = []
   CSV.foreach(csv_file_name, :headers => true) do |row|
      songname, artist, album, time, id = row[0],row[1], row[2], row[3], row[4
      unless (songname =~ /#/)
          songs << Song.new(songname,album,artist,time.to_f, nil, id)
      end
    end
   songs
 end

 #read in the owners.csv file
 def read_in_ownership(csv_file_name, temp_hash = Hash.new)
   CSV.foreach(csv_file_name, :headers => true) do |row|
       song_id, owner_data = row[0], row[1]
       unless (song_id =~ /#/)
              temp_hash[song_id] = owner_data
          end
    end
    temp_hash
 end
```

recall csv i/o

create song inst

return song array

will give us hash

reg exp

return hash map

reader.rb

Part E:

some issues arising...

Issues I: I/O Interface

in reading in from files, most things are strings (and may have control characters); e.g., “2”

So, we need to be careful to convert “2” to 2; using e.g., to_i or to_f

chomp takes care of control characters at the end

need to be careful that things are the type we want, should do it as they enter the program

Issues II: Objects or Names

similarly, we are often juggling objects and the names of those objects; Util.fetch(“pony”) => <#song pony> or storing arrays of objs or arrays of ids

this becomes a major problem within the program; as we have to check entering each method whether we have a string-name or an obj

best, to avoid this and use objects from the top level

then, we are doing true OOP, letting the methods do the type-checking

Issues III: Finding Objects

we have used Global variables: **$songs $albums…**

We could have used **@@songs** *class variable* but both probably should be avoided

but, we will do it to see how such variables work

Phew !