

برنامه نویسی شیء گرا

سید هادی هاشمی

کیارش بازرگان

(از اسلایدهای دکتر رامتین خسروی دانشگاه تهران نیز استفاده شده است)

برنامه های پیچیده

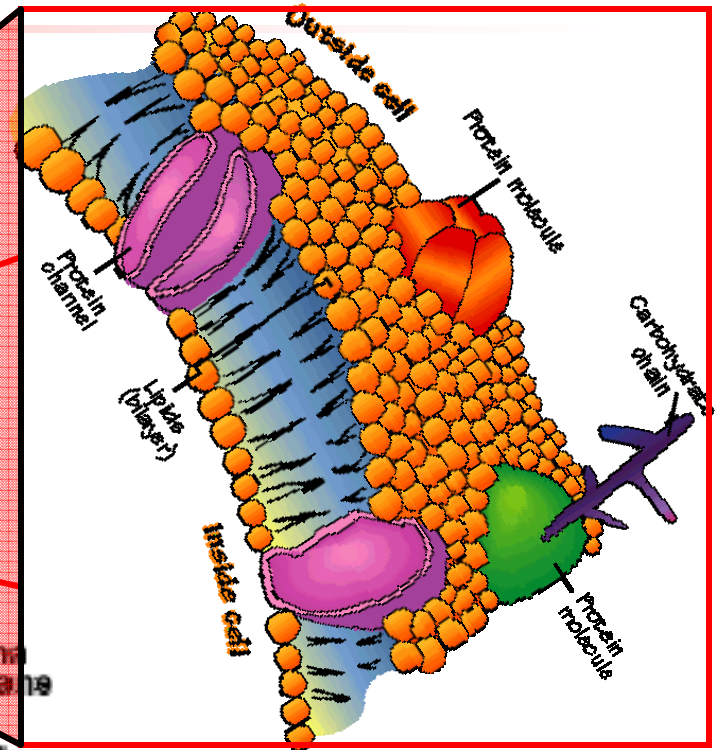
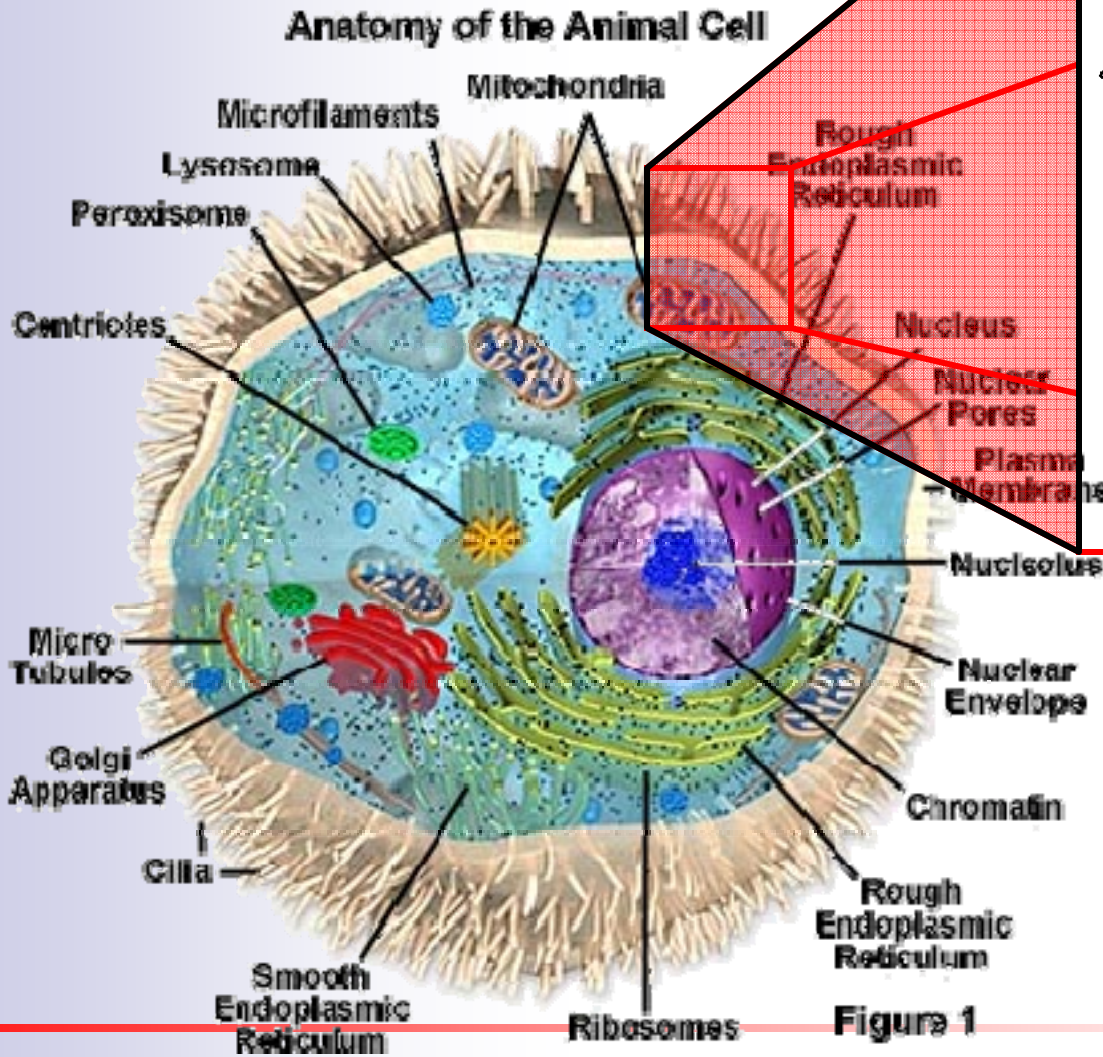
- Grand Auto Theft (game)



http://www.gamershell.com/pc/gta_2/screenshots.html?id=3

سلول

<http://micro.magnet.fsu.edu/cells/animalcell.html>

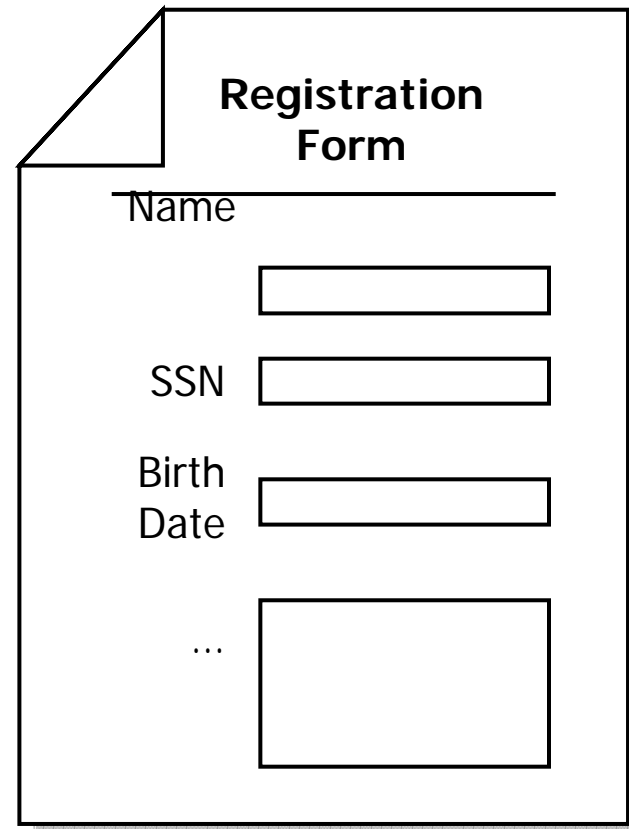


http://library.thinkquest.org/C004535/cell_membranes.html

Figure 1

Representing Form Data

```
char name[100];  
  
long ssn;  
  
struct Date {  
    int day;  
    int month;  
    int year;  
} bdate;
```



Registration Form

Name

SSN

Birth Date

...

The diagram shows a registration form with a title 'Registration Form' in a box at the top right. Below the title, there are four input fields. The first field is labeled 'Name', the second 'SSN', the third 'Birth Date', and the fourth is preceded by an ellipsis '...'.

Discussion

- What's wrong with our method of storing dates?

```
struct Date {  
    int day;  
    int month;  
    int year;  
} bdate;
```



Problems with Date

- Problem 1 – Inconsistent Data

```
bdate.day = 31;  
bdate.month = 8;  
bdate.year = 1379;
```

Our data type is **insecure**

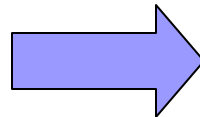
Problems with Date

- Problem 2 – Changing the Representation

```
typedef long Date;
```

Number of days since a fixed origin

```
bdate.day = 31;  
bdate.month = 6;  
bdate.year = 1379;
```



```
bdate = 29041;
```

Our data type is **inflexible**

In Practice

- The real problem is with clients of Date
- Who are the **clients** of your code?

Yourself !

Co-workers in your team

Customers of your libraries

All developers in the world !

control over
the client



potential clients
number of



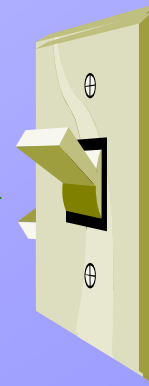
Interface and Implementation



...that act on the
implementation

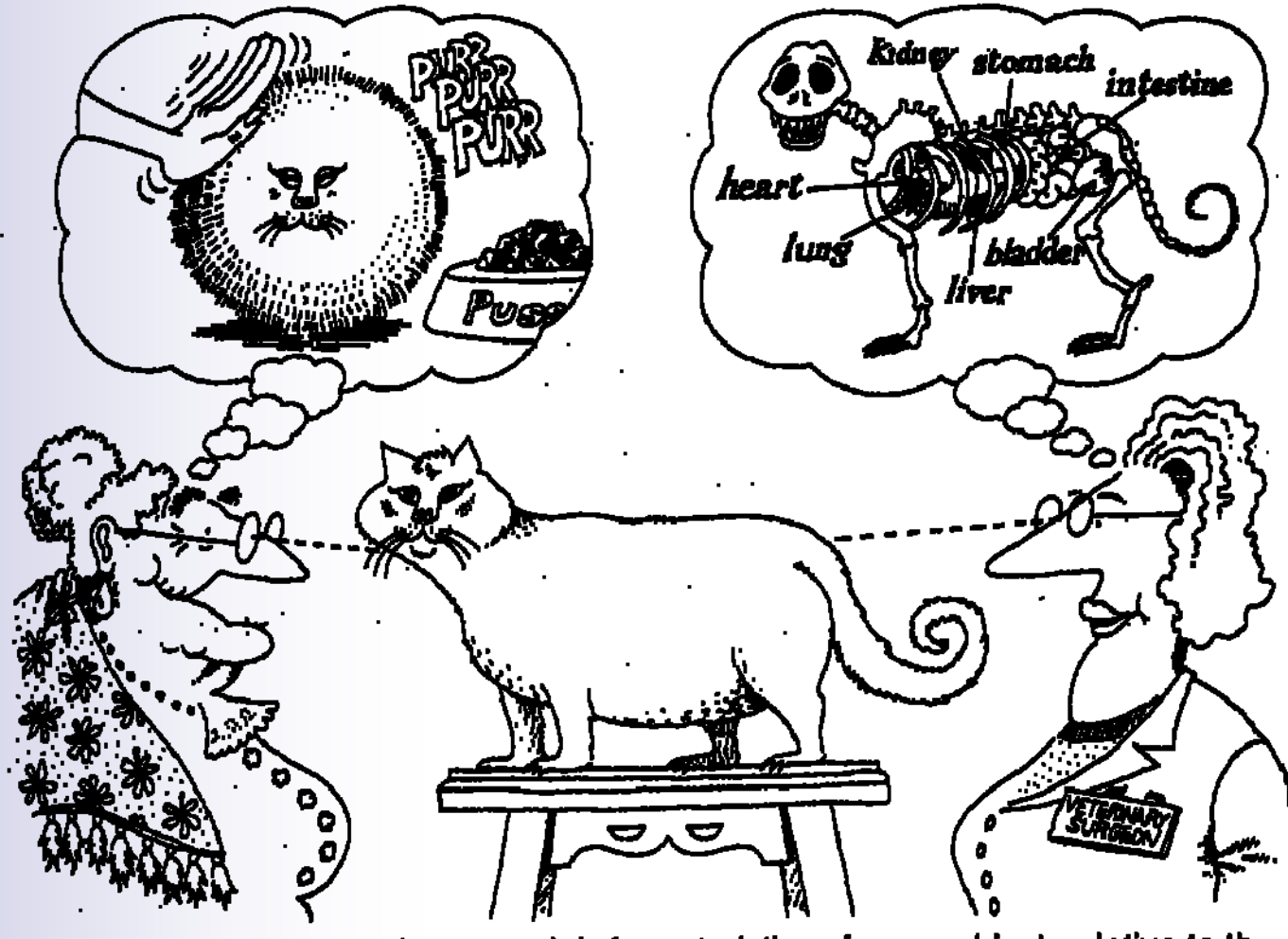


Interface
provides some
operations...



- switch on
- switch off

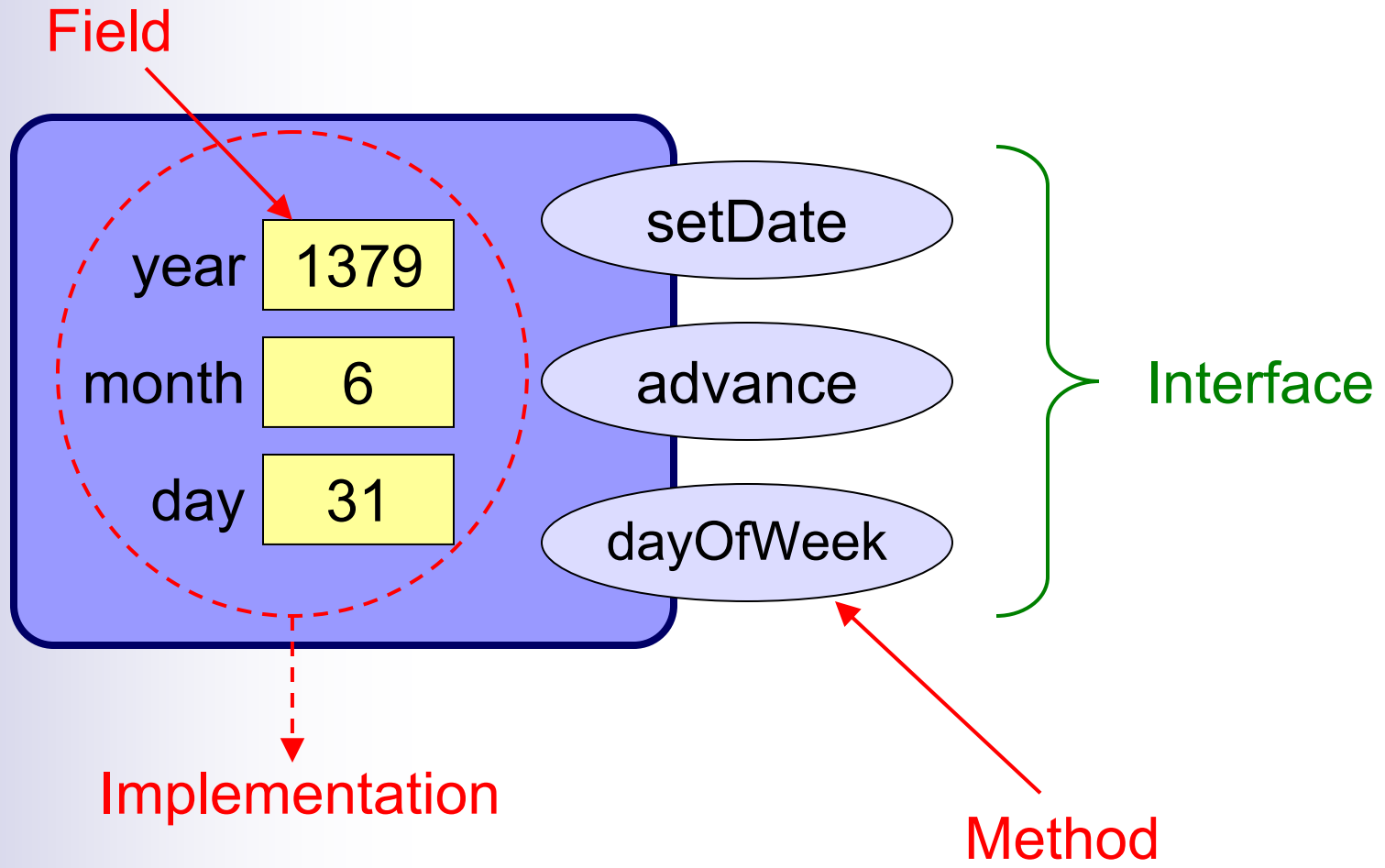
تجريد Abstraction



تجريد Abstraction

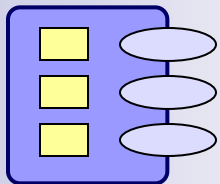


A Date Object

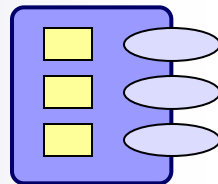


Multiple Objects

D1

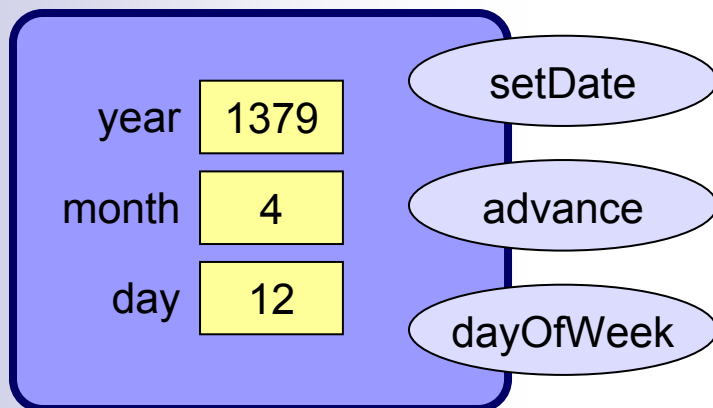


D2

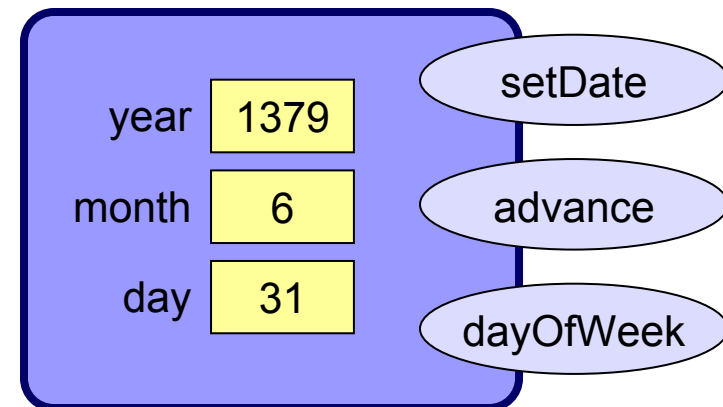


- We can have many date objects
- Storing various values in their fields

ddate



bdate



Multiple Objects



Multiple Objects



كلاس Class

Class
Lemur



on your computer

Class
Lion



on your computer

Class
Monkey



on your computer

Class
Mouse

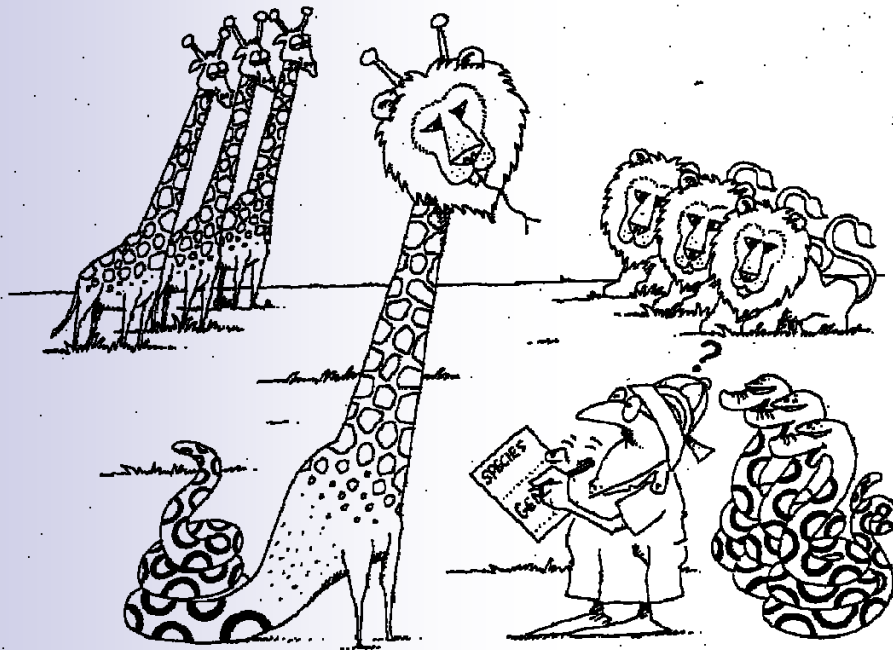


on your computer

Class
Penguin



on your computer

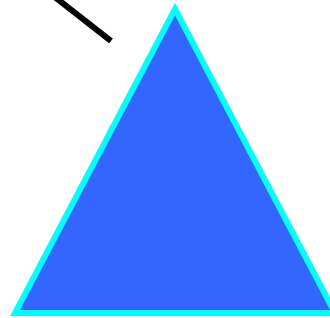
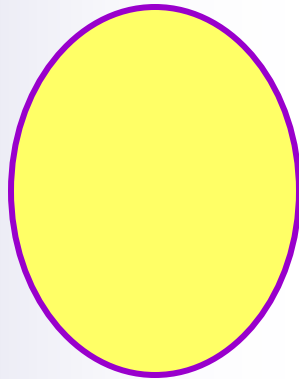
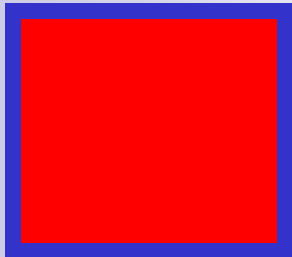


Inheritance وراثت

شکل هندسی

رنگ داخل
رنگ حاشیه
ضخامت حاشیه

آدم دست، پا، راه
رفتن، ...



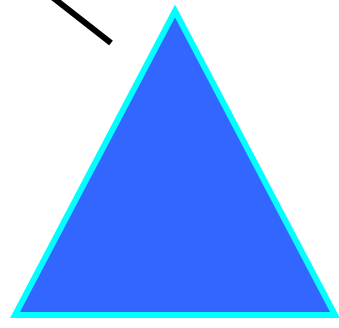
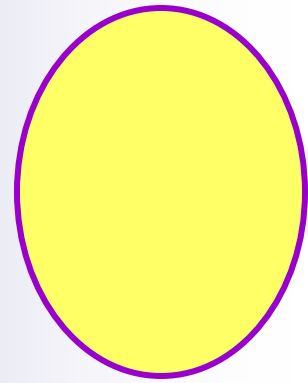
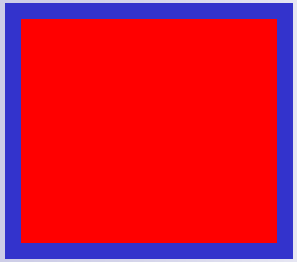
Polymorphism چند ریختی

شکل هندسی

خودت رو روی
صفحه بکش

آدم

سلام کن



ترکیب Composition

