



# Moving from C to Java



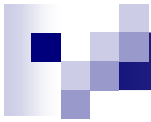
# The Java Syntax We Know

sequencing	$P_1; P_2$
blocks (compound statements)	$\{ P_1 \}$
conditional (selection)	if ( <i>condition</i> ) $S_1$ else $S_2$
conditional (single selection)	if ( <i>condition</i> ) $S_1$
while loops	while ( <i>condition</i> ) $S_1$
do-while loops	do $S_1$ while ( <i>condition</i> )
for loops	for ( $S_1$ ; <i>condition</i> ; $S_2$ ) $S_3$
multiple selection	switch ( <i>expr</i> ) { case $const_1$ : $S_1$ ... case $const_n$ : $S_n$ default: $S_{n+1}$ }



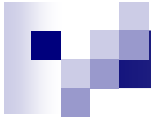
# Java Types

- Some of the types we know and love are still there
  - Integer: byte, short, char, int, long
  - Floating Point: float, double
- And we even get a boolean type



# Java Types

- There are no pointers in Java, but they aren't necessary for referential types.
- All primitive types, i.e. the ones we know about are pass by value.
- All classes, wrappers, interfaces and arrays are actually references
- (Will go back to classes and arrays, leaver wrappers and interfaces for later)



# The basics

- Everything in life has 3 important parts (not to say the other parts aren't)
  - A state; The things that define this object from a similar one
  - An interface to the state; The ways we can interact with the state of this object
    - Interfaces can be both public and private
  - A set of Behaviours; The things this object can do
- Java classes have all of these things too



# The Skeleton Java Class

- Below is a basic Java Class

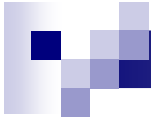
```
Public class Name
{
    /* State Goes Here*/

    public Name(arguments){} //The constructor

    /*Methods go here*/

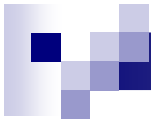
    public static void main(String [] args){}
}
```

- All Java classes must have a constructor
- They do not all have to have a main, only your main (Duhh!!!)



# State in Java

- The state of a class in Java are the variables global to the class. Why??
- This is because a class encapsulates an object, meaning it contains everything that is an object.
- State can of course be variables of any type



# Variables of Class Type

- All class variables are referential types (think pointers)
- They all have a state, behaviours and a public interface detailing them.
- A giant library of classes in Java can be found in the API (bookmark this)  
<http://java.sun.com/j2se/1.5.0/docs/api/>





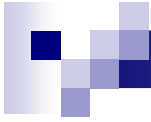
# Java Arrays

- Earlier I said Arrays are referential types, what does this mean??
- In Java when we say `int numbers []` this is similar to `int *numbers`. We create a reference/pointer to a piece in memory but there is nothing there.
- Classes work the same way; `String name` is similar to `char *name`, it is only pointing to memory.



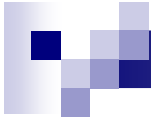
# Instantiating And “new”

- Both classes and arrays must be instantiated to be used.
- We do this with the command new, which calls the constructor for us
- `String name = new String (“Jeff”)`
- In Java we have method overloading, which means we can have many functions with the same name but different arguments, like constructors
- `char letters [] = {'a','j','e','f','f','z'};`
- `String name = new String(letters,1,4);`



# Interface in Java

- When we say public java class, we are defining interface.
- Here are two main types of interfacing Java allows (more will be explained later)
  - Private; This means it is visible only within the class. State is usually private.
  - Public; This means that when you see the class you see this too. Constructors are public.



# Behaviours in Java

- All the methods of a class are its behaviours.
- In C a function is only a behaviour because we define it to be, in Java a function is only not a behaviour when we define it that way.
- Because methods are native to the class they can access all class objects



# Methods Example

- ```
public class IntHolder
{
    private int myNum;

    public IntHolder(int i) {myNum=i;}

    //Below is a very basic selector
    public int getNum()
    {
        return myNum;
    }
}
```

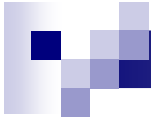
- Then when we want to use this method we simply go  

```
IntHolder temp = new Intholder(5);
temp.getNum()
```



# Back To The Basics

- Everything in life has 3 important parts (not to say the other parts aren't)
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# The SE view on life

- Lets take the example of a Cat
  - State = things like colour, breed, state of hunger, cleanliness, etc
  - Public interface = We can see the colour, we can feed the cat, we can pet the cat.
  - Private interface = Only the cat can interface with its thoughts, you or I cannot (We don't even really KNOW the cat has thoughts)
  - A set of behaviours = The cat can eat, sleep, preen, terrorize mice, etc



# Cat in C

- To define the state we create the type

```
Typedef struct
{
    char* name;
    char* breed;
    int hunger;
}Cat;
```

- The public interface is the contents of the header file
- The private interface would be any internal functions
- To define the behaviour we create other functions

```
void eat(Cat *chat, int foodAmount)
{
    chat->hunger = (chat->hunger-foodAmount)<0?0:(chat->hunger-
        foodAmount);
}
```





# Cat in Java

```
■ public class Cat
  { //The state
    private String name;
    private String breed;
    private int hunger;

    public Cat(){} // This is a basic constructor

    //This behaviour
    public void eat(int foodAmount)
    {
        hunger = (hunger-foodAmount)<0?0:(hunger-
            foodAmount);
    }
  }
```



# Classes, Modules & SE Design (Oh My)

- The most obvious of the qualities is of course modularity
- Abstraction; By viewing computer objects like real life object we can achieve a higher level of abstraction
- Information Hiding; Through public and private interfaces.