Classes and Objects in Java

By the end of this video you will be able to…

- Motivate the use of classes and objects in programming
- Write classes in Java
- Create objects and call methods on them
- Describe what member variables, methods and constructors are

Computer Science is…

The science of using and processing

large amounts of information

to automate useful tasks

and learn about the world around us

(using a computer)

Map

Shape

Location

Color

Window

… and plenty more objects

Like a factory

A *class* is a **type** of data

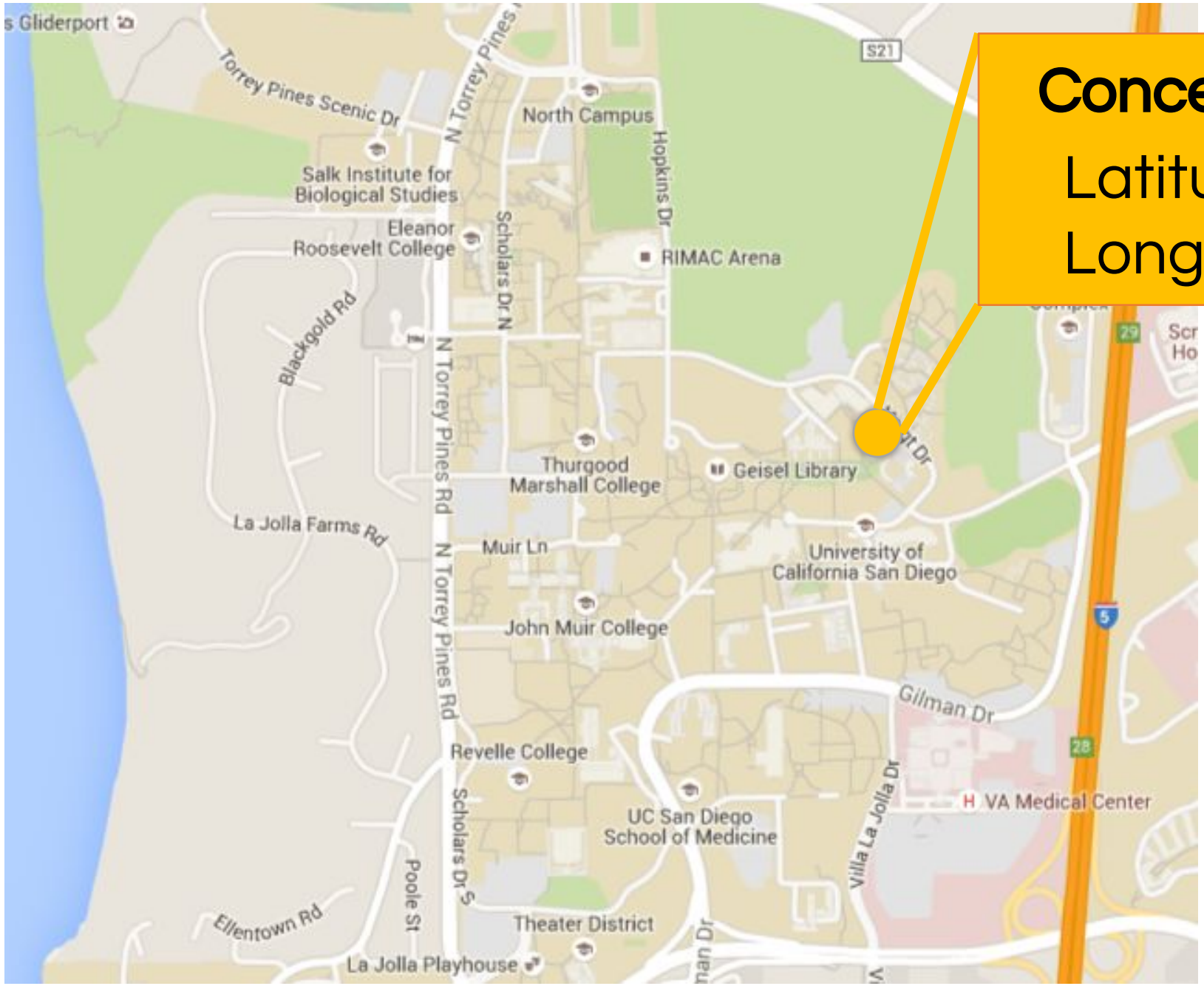
An *object* is one such **piece of data***

The thing comes out from the factory (class)

* With associated functionality

A class can produce multiple objects, with unique features.


NORTH AMERICA
EUROPE
ASIA
Atlantic Ocean
AFRICA
SOUTH AMERICA
Pacific Ocean
Indian Ocean
ANTARCTICA


Concept of location
Latitude: 32.9
Longitude: -117.2
Torrey Pines Scenic Dr
N Torrey Pines
North Campus
Hopkins Dr
Salk Institute for Biological Studies
Eleanor Roosevelt College
Scholars Dr N
RIMAC Arena
Blackgold Rd
N Torrey Pines Rd
Thurgood Marshall College
Geisel Library
La Jolla Farms Rd
Muir Ln
University of California San Diego
John Muir College
Gilman Dr
Revelle College
Scholars Dr S
Villa La Jolla Dr
VA Medical Center
UC San Diego School of Medicine
Poole St
Ellentown Rd
Theater District
La Jolla Playhouse
S21
5
28
29

Defining a Class

```
public class SimpleLocation
{
    public double latitude;
    public double longitude;

    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other) {
    ...
```

Must be in file

SimpleLocation.java

same file name as the class (public class)

```
public class SimpleLocation
{
    public double latitude;
    public double longitude;

    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other) {
    ...
```

Member variables:
data the objects need to store

```
public class SimpleLocation
{
    public double la
    public double lo
```

Methods:
The things this class can do

```
public SimpleLocation(double lat, double lon)
{
    this.latitude = lat;
    this.longitude = lon;
}
public double distance(SimpleLocation other) {
...
```

```
public class SimpleLocation
{
    public double la
    public double lo
```

no return type

name same as the class

Constructor:
Method to create a new object

```
    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other) {
    ...
```

```
public class SimpleLocation
{
    public double latitude;
    public double longitude;

    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other)
    {
        // Body not shown
    }
}
```

In file

SimpleLocation.java

Creating and using objects

everything in java must be a class

```
public class LocationTester
{
   public static void main(String[] args)
   {
      SimpleLocation ucsd =
            new SimpleLocation(32.9, -117.2);
      SimpleLocation lima =
            new SimpleLocation(-12.0, -77.0);

      System.out.println(ucsd.distance(lima));
   }
}
```

In file

LocationTester.java

```
public class LocationTester
{
  public static void main(String[] args)
  {
     SimpleLocation ucsd =
          new SimpleLocation(32.9, -117.2);
     SimpleLocation lima =
          new SimpleLocation(-12.0, -77.0);

     System.out.println(ucsd.distance(lima));
  }
}
```

```
public class SimpleLocation
{
    public double latitude;
    public double longitude;

    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other) {
    ...
```

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public class LocationTester
{
  public static void main(String[] args)
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     SimpleLocation ucsd =
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     System.out.println(ucsd.distance(lima));
  }
}
```

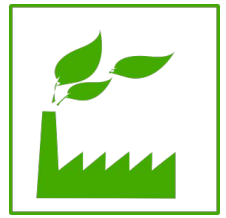
```
public class SimpleLocation
{
    public double latitude;
    public double longitude;

    public SimpleLocation(double lat, double lon)
    {
        this.latitude = lat;
        this.longitude = lon;
    }
    public double distance(SimpleLocation other) {
    ...
```

ucsd.distance(lima)

```
public double distance(SimpleLocation other)
{
    return getDist(this.latitude, this.longitude,
                   other.latitude, other.longitude);
}
```

the constructor use this to assign value to the parameters



"this" is the calling object

the object that calls the method

```
public class LocationTester
{
  public static void main(String[] args)
  {
     SimpleLocation ucsd =
          new SimpleLocation(32.9, -117.2);
     SimpleLocation lima =
          new SimpleLocation(-12.0, -77.0);

     System.out.println(ucsd.distance(lima));
  }
}
```

```
% javac *.java
% java LocationTester
6567.659
```