NJUSWI
2002-2012
Anniversary
南京大學 软件学院

在一起

刘 钦

南京大学软件学院

系统的需求

- 我们正在开发GPS系统的一部分
- 用经度和纬度来代表一个位置
- 希望能够计算两个点之间的具体和方向

- 问：
- 如何设计一个类或者两个类来实现这个需求？

```
public class Position
{
  public double latitude;
  public double longitude;
}
```

```
public class PositionUtility
{
  public static double distance( Position position1, Position position2 )
  {
    // Calculate and return the distance between the specified positions.
  }
  public static double heading( Position position1, Position position2 )
  {
    // Calculate and return the heading from position1 to position2.
  }
}
```

Bad Design - A

```
// Create a Position representing my house
Position myHouse = new Position();
myHouse.latitude =    36.538611;
myHouse.longitude = -121.797500;
// Create a Position representing a local coffee shop
Position coffeeShop = new Position();
coffeeShop.latitude =    36.539722;
coffeeShop.longitude = -121.907222;
// Use a PositionUtility to calculate distance and heading f
// to the local coffee shop.
double distance = PositionUtility.distance( myHouse, coffeeS
double heading  = PositionUtility.heading(  myHouse, coffeeS
// Print results
System.out.println
  ( "From my house at (" +
    myHouse.latitude + ", " + myHouse.longitude +
    ") to the coffee shop at (" +
    coffeeShop.latitude + ", " + coffeeShop.longitude +
    ") is a distance of " + distance +
    " at a heading of " + heading + " degrees."
  );
```

Problems for Design 1 - A

- Welcome to 1972!
- Fortran excitedly used the new International Mathematics and Statistics Library (IMSL) in just this manner

Bad Design - B

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

    public static double calculateDistance(double x1, double y1, double x2, double y2) {

    }
    public static double calculateDirection(double x1, double y1, double x2, double y2){

    }
}
```

Bad Design - C

- public class Position {
- 	double latitude;
- 	double longitude;
- 	public double getDistance(double x2, double y2){
-
- 	}
- 	public double getDirection(double x2, double y2){
-
- 	}
- }

Bad Design - D

```
public class Position {
    double x1,x2,y1,y2;

    public double calculateDistance(){

    }
    public double calculateDirection(){

    }
}
```

```
public class Position
{
  public double distance( Position position )
  {
    // Calculate and return the distance from this object to
    // position.
  }
  public double heading( Position position )
  {
    // Calculate and return the heading from this object to
    // position.
  }
  public double latitude;
  public double longitude;
}
```

Good Design

```
Position myHouse = new Position();
myHouse.latitude =    36.538611;
myHouse.longitude = -121.797500;
Position coffeeShop = new Position();
coffeeShop.latitude =    36.539722;
coffeeShop.longitude = -121.907222;
double distance = myHouse.distance( coffeeShop );
double heading = myHouse.heading( coffeeShop );
System.out.println
  ( "From my house at (" +
    myHouse.latitude + ", " + myHouse.longitude +
    ") to the coffee shop at (" +
    coffeeShop.latitude + ", " + coffeeShop.longitude +
    ") is a distance of " + distance +
    " at a heading of " + heading + " degrees."
  );
```