

- Previous Lecture:
 - Two-dimensional array of numbers
 - Manipulating 2-d arrays
- Today's Lecture:
 - 2-d array of objects—a `String` is an object
 - Review arrays of objects (1- and 2-d)
- Reading:
 - Review String methods on pp 37-44. (No need to memorize the methods! Just be aware of the kinds of `String` methods available for future reference.)

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When might I use `public` fields?

- Client needs easy access to fields
- The only "service" that the class provides is to collect related data under one (class) name
- One should still consider using `private` fields though!

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Example: cubicle world

Implement a class `CubicleWorld` that has a 2-d array of `Cubicles`, so a `CubicleWorld` is like a floor plan.

The array has dimensions just big enough to store the entire floor plan including internal spaces.

A `Cubicle` object has fields `name`, `row`, `column`.

| row | | | | |
|-----|---------|---------|---------|----------|
| 1 | Alice | Dilbert | Dogbert | |
| 2 | Ratbert | | Wally | |
| 3 | Asok | Carol | Catbert | P-H Boss |
| | 1 | 2 | 3 | 4 |
| | column | | | |

Instantiating 2-d arrays

- A 2-d array is a 1-d array of 1-d arrays
- You can create one dimension at a time:
 1. Declare a reference variable for the 2-d array
 2. Set 1st dimension (# rows)—create a 1-d array to hold the row references
 3. Set 2nd dimension (# columns) **one row at a time**—create the individual arrays that store the values (or object references) of interest
 4. Now can assign values (or references) into the cells of the array

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What we learned...

- Develop/implement **algorithms** for problems
- Develop programming skills
 - Design, implement, document, test, and debug
- Apply programming languages
 - Control structures
 - Function/methods for reducing redundancy
 - Data structure
 - Fundamentals of object oriented programming, including inheritance
- Specific tasks
 - Simulating systems
 - Sorting
 - Searching
 - Plotting numeric data

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Final Exam

- Thurs, May 11, 2-4:30pm, Barton E.
- 2/3 Java, 1/3 MATLAB
- Closed-book exam, no calculators
- Bring student ID card
- Check for announcements on webpage:
 - Study break office/consulting hours
 - Review session time and location
 - Review questions
 - List of potentially useful functions/methods

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```

/* A Cubicle in some office. Row and column numbers start at 1 */
// The only "service" that this class provides is to collect related
// data in a Cubicle object. (Notice that there're no methods other
// than the most basic ones: constructor and toString.) In such a case,
// one may choose to make the fields public.
class Cubicle {
    public String name; //name of person who uses the Cubicle
    public int row;     //row number of the Cubicle
    public int column;  //column number of the Cubicle

    /* Constructor: Person n uses this Cubicle which is in row r, column c */
    public Cubicle(String n, int r, int c) {
        name= n;
        row= r;
        column= c;
    }

    /* = a String containing the data values of this Cubicle */
    public String toString() {
        return name + "'s cubicle is at row " + row + ", column " + column ;
    }
} //class Cubicle

```

```

/* A CubicleWorld is a a 2-d array of Cubicles */
public class CubicleWorld {
    private Cubicle[][] floorPlan; //Refers to 2-d array of Cubicles
    private int rows;              //Number of rows in floor plan
    private int[] columns;         //columns[i] is # of columns in row i of floor plan

    /* Constructor: set the values of the fields */
    public CubicleWorld(int rows, int[] cols) {

        //Set 1st dimension of floor plan (number of rows)

        //Set 2nd dimension of floor plan one row at a time

    }

    /* Fill this CubicleWorld's floor plan */
    public void fillFloorPlan(Cubicle[] cubes) {

    }

    /* =Get Cubicle at row r, column c. Row, column numbers start at 1 */
    public Cubicle getCubicle(int r, int c) {

    }

}

//class CubicleWorld continues on next page

```

```
//class CubicleWorld, continued

/* ={Person with name s is found in this CubicleWorld}, true or false.
 * Display the Cubicle location(s) of person(s) with name s */
public boolean findPerson(String s) {

}

public static void main(String[] args) {

    int rows= 3;                //Number of rows of Cubicles
    int[] columns= {3, 3, 4};    //Number of columns of Cubicles

    //Cubicle data collected as a 1-d array
    //(Remember that Cubicle row and column numbers start at 1)
    Cubicle[] workers= new Cubicle[] { new Cubicle("Alice", 1, 1),
                                        new Cubicle("Dilbert", 1, 2),
                                        new Cubicle("Dogbert", 1, 3),
                                        new Cubicle("Ratbert", 2, 1),
                                        new Cubicle("Wally", 2, 3),
                                        new Cubicle("Asok", 3, 1),
                                        new Cubicle("Carol", 3, 2),
                                        new Cubicle("Catbert", 3, 3),
                                        new Cubicle("P-H Boss", 3, 4)
                                        };

    //Create a CubicleWorld that is just big enough for all the workers
    CubicleWorld cw= new CubicleWorld(rows, columns);
    //Now put the workers (Cubicles) into the floorPlan
    cw.fillFloorPlan(workers);

    //Let's test a few cases:
    System.out.println(cw.getCubicle(1,3));
    System.out.println(cw.getCubicle(2,2));
    System.out.println(cw.getCubicle(3,4));

    boolean foundPerson;
    foundPerson= cw.findPerson("Ratbert");
    foundPerson= cw.findPerson("Garfield");
}
} //class CubicleWorld
```