

Lesson 75: 2D Arrays (W24D3)

Balboa High School

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Do Now

- 1 In new project L75, create a class called `ArrayRemoval`.
- 2 In that class' `main()`, declare and instantiate an array of chars having these values:

A	a	l	i	c	e
---	---	---	---	---	---
- 3 Using a `for()` loop, remove the excess 'a' by shuffling all elements after that position to the left by one.
- 4 Resize the array so that there aren't any extra elements present.

Once finished with the assignment, begin preparing questions you have about PS #12, §§10-11.

Students will begin working with two-dimensional (2D) arrays.

Any Questions?

What questions do you have re: PS #12, §§10-11?

Any general questions re: arrays and ArrayLists? We have a quiz next class!

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- Consider the need to store a set of test scores for one student:

```
int[] myTests = {79, 84, 92, 100};
```

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- Sometimes we need more advanced data structures.
- Consider the need to store a set of test scores for one student:
`int[] myTests = {79, 84, 92, 100};`
- How would you store test scores for an entire class?
 - Create a new, named array for each student's tests?
 - What if you don't know how many students there are going to be until the program consults a database, reads from a text file, etc.?

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 - elt 0 could point to an array having Jenny's scores
 - elt 1 could point to an array having John's scores
 - etc...

Foray into 2D Arrays

- Let's say we have these students and scores:
 - Brian: { 63, 81, 75, 79 }
 - Christine: { 92, 89, 99, 86 }
 - Donna: { 84, 95, 66, 80 }

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- Christine: { 92, 89, 99, 86 }
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- We can use an `ArrayList<String>` to store the names:

```
ArrayList<String> students = new ArrayList<String>();  
students.add("Brian");  
students.add("Christine");  
students.add("Donna");
```

Foray into 2D Arrays

- An *array of arrays* (aka *two-dimensional array*, or *2D array*) can hold the scores:

```
int[] [] scores = new int[3][4];
```

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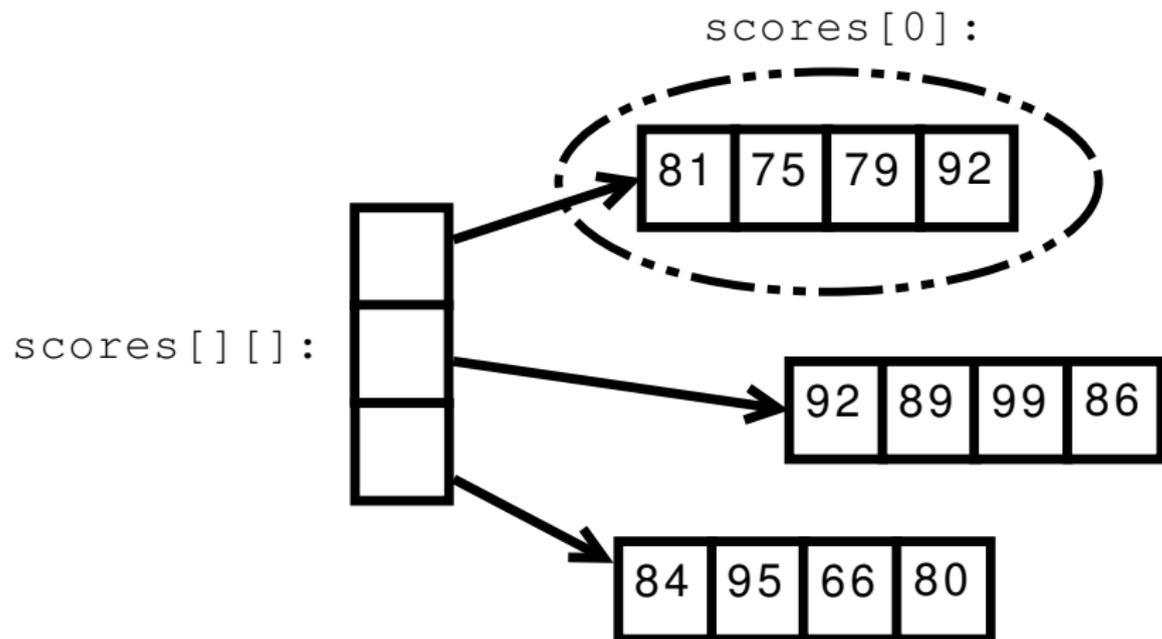
```
int[] [] scores = new int[3][4];
```

- Now let's populate the 2D array:

```
scores[0][0] = 63; //brian's 1st test  
scores[0][1] = 81; //brian's 2nd test  
scores[0][2] = 75; //brian's 3rd test  
scores[0][3] = 79; //brian's 4th test  
scores[1][0] = 92; //christine's 1st test  
...
```

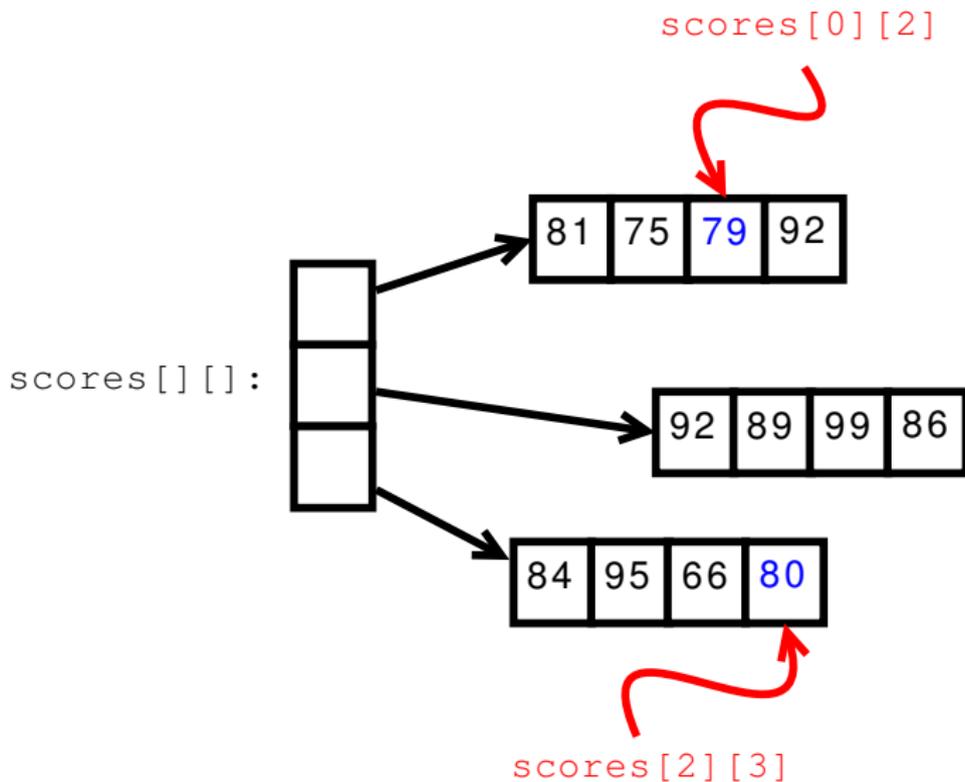
Foray into 2D Arrays

Visualizing scores [] []:



Foray into 2D Arrays

Accessing specific elements:



- Download and import into L75: [StudentScores.java](#)
- Complete the statement that stores Christine's 3rd test score in `int ChristineThirdTest`.
- Read through the code that appears after that to see how the `ArrayList<String>` is used to locate a particular student's scores.

Shortcut!

```
int[] [] scores =  
    new int[3][4];  
  
scores[0][0] = 63;  
scores[0][1] = 81;  
scores[0][2] = 75;  
scores[0][3] = 79;  
  
scores[1][0] = 92;  
scores[1][1] = 89;  
scores[1][2] = 99;  
scores[1][3] = 86;  
  
scores[2][0] = 84;  
scores[2][1] = 95;  
scores[2][2] = 66;  
scores[2][3] = 80;
```

Shortcut!

```
int[] [] scores =  
    new int[3][4];
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```
scores[0][0] = 63;  
scores[0][1] = 81;  
scores[0][2] = 75;  
scores[0][3] = 79;
```

```
scores[1][0] = 92;  
scores[1][1] = 89;  
scores[1][2] = 99;  
scores[1][3] = 86;
```

```
scores[2][0] = 84;  
scores[2][1] = 95;  
scores[2][2] = 66;  
scores[2][3] = 80;
```



```
int[] [] scores = {  
    { 63, 81, 75, 79 },  
    { 92, 89, 99, 86 },  
    { 84, 95, 66, 80 }  
};
```

Application of 2D Arrays: Games!

See Pac-Man [here](#)...

- Work on PS #12; it's due in two class days!
- Next class:
 - \approx 1st half will be a quiz
 - afterward, PS #12 support

Finish remaining parts of PS #12, ask questions you still have after the quiz tomorrow.