How can we store a table of values?

Let’s say there’s a class of 8 students, with 10 quiz grades each:

<table>
<thead>
<tr>
<th>7.5</th>
<th>4.5</th>
<th>9.5</th>
<th>2</th>
<th>7</th>
<th>8.5</th>
<th>1</th>
<th>8.5</th>
<th>7.5</th>
<th>6</th>
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</tr>
<tr>
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<td>2</td>
<td>9</td>
<td>9</td>
<td>5.5</td>
<td>4</td>
<td>7.5</td>
<td>6</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

How can we declare variables to store all this data?

Multi-dimensional arrays

Solution 1: An array per student

double [] student1 = new double[10];
... 
double [] student8 = new double[10]; 

student1: 7.5 4.5 9.5 2 7 8.5 1 8.5 7.5 6 
... 
student8: 4.5 2 9 9 5.5 4 7.5 6 5 9

Tedious!

Solution 2: An array per quiz

double [] quiz1 = new double[8];
... 
double [] quiz10 = new double[8]; 

quiz1: 7.5 ... ... ... ... ... ... 4.5 
... 
quiz10: 6 ... ... ... ... ... ... 9

Tedious!
Ragged 2-D arrays

double [][] quizScores = new double[4][];
quizScores[0] = new double[3];
quizScores[2] = new double[5];

2-D Arrays in memory

A 2-D array is really an array of arrays!

double [][] quizScores = new double[4][3];

Exercises

- Compute the trace, or sum of the elements on the diagonal of a matrix.

- Swap each element in a square 2-D array with elements on the opposite side of the main diagonal.

Solution 3: 2-dimensional arrays!

double [][] quizScores = new double[8][10];
quizScores:

2-D Arrays in memory

A 2-D array is really an array of arrays!

double [][] quizScores = new double[4][3];

Exercises

- Compute the trace, or sum of the elements on the diagonal of a matrix.

- Swap each element in a square 2-D array with elements on the opposite side of the main diagonal.