

## Lab 06: Building an Orchestra

In this lab, you'll build your very own orchestra!

### Instruments (5)

In an orchestra, you have many instruments. Implement an interface that represents an instrument. All instruments need to implement a play method (**public void play()**), and a tune method (**public void tune(char note)**).

In your orchestras, you'll need to have a Viola, Cello, and Tuba. All three are constructed with a string that denotes the song they will play. The Tuba, however, also accepts a second parameter that dictates the number of times it plays `oom pa pa` after playing the song. Each of these must implement the tune method by printing something like: Tuning Tuba to note: C

When you play the instruments they print that they are playing the song they currently assigned to play. The tuba is the only one which plays `oom pa pa` some number of times at the end of the song it plays.

Feel free to change the instruments in your orchestra (just make sure you have one that plays something extra at the end like the Tuba).

### Orchestra (15)

Use your Instruments to create an Orchestra class that has an "unbounded" array of Instruments (no ArrayLists here, only array with `[ ]` ). It will need a method to add Instruments to the array. If the orchestra is full, increase it's size by 50%.

Implement an iterator for this class with hasNext, next, and remove methods. The remove method will need to ensure that there are no holes in the array (null values) and the next and hasNext methods will need to gracefully handle reaching the end of the Instruments in the array before the null value without raising an Exception.

Your orchestra will then need a method for playing all the instruments (playAll), and for tuning all of the instruments to a single note (tuneAll).

## GenOrchestra (10)

Reimplement the Orchestra above using an ArrayList (like we did for the Team class in Lab 05).

## Testing (5)

Ensure that you test all of your methods! Have them tune to all sorts of notes, and play all sorts of songs. Here are some ideas:

- Bach: suites for solo Violoncello
- Andrew Macdonald: The Great Square of Pegasus:
- Bach: Symphony no 1 to 4
- Sonata no 1
- Bach: Suite no 1

While running these tests, add an object an Orchestra by using an anonymous class that represents a **Trumpet** to the Orchestra.

## Grading Criteria:

Style/submission guidelines: [https://gmierzwinski.github.io/bishops/cs321/style\\_guidelines.html](https://gmierzwinski.github.io/bishops/cs321/style_guidelines.html)

<b>Comments, Formatting, &amp; Readability</b>	<b>5 Marks</b>
<b>Submission Guidelines</b>	<b>5 Marks</b>
<b>Program</b>	<b>30 Marks</b> <b>See (X) above</b>
<b>Testing</b>	<b>5 Marks</b>
<b>Total</b>	<b>45 Marks</b>