Assertions

CS 272 Software Development

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Introduction

- Makes programming assumptions (hopes?) explicit
  - e.g. assuming input in private method is never null

- Can embed throughout code for debugging
  - No output produced if assertion is correct or disabled

- Can enable or disable assertions via a compiler flag
  - Add **–ea** flag as vm argument when running

https://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html

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Using Assertions

Remember, assertions can be disabled!

- Do not use for input validation in public methods

- Do not use assertions to perform actions necessary for functionality of program

http://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html

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Use for Internal Invariants

```
1. if (i % 3 == 0) {
2.     ...
3. } else if (i % 3 == 1) {
4.     ...
5. } else {
6.     assert i % 3 == 2;
7.     ...
8. }
```

```
1. switch (value) {
2.     case 0:
3.         ...
4.     case 1:
5.         ...
6.     default:
7.         assert false;
8. }
```

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Use for Control Invariants

```
1. private void printFirst(List<String> items, String find) {
2.    for (String item : items) {
3.      if (item.equals(find)) {
4.          System.out.println("Found: " + item);
5.          return;
6.      }
7.    }
8.    assert false;
9. }
```

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Use for Private Preconditions

```
1. public void addWord(String word) {
2.   if (word ≠ null) {
3.     words.add(convertString(word));
4.   }
5. }


6. private String convertString(String text) {
7.   assert text ≠ null;
8.    ...
9.   return text;
10. }
```

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Use for Postconditions

```java
1. public long copy(Path source, Path destination) {
2.   try {
3.     copyFile(source, destination);
4.   } catch (Exception ex) {
5.     return -1;
6.   }
7.   assert Files.size(source) == Files.size(destination);
8.   return Files.size(destination);
9. }
```

http://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html

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Summary

- Do use for **assumptions** made by programmer

- Do use to verify input in **private** methods

- Do NOT use to validate user input in **public** methods

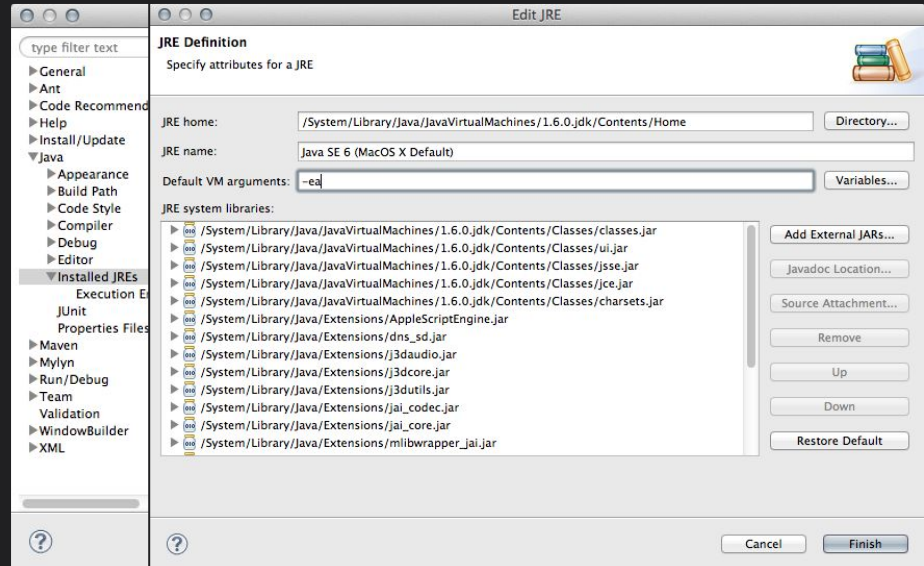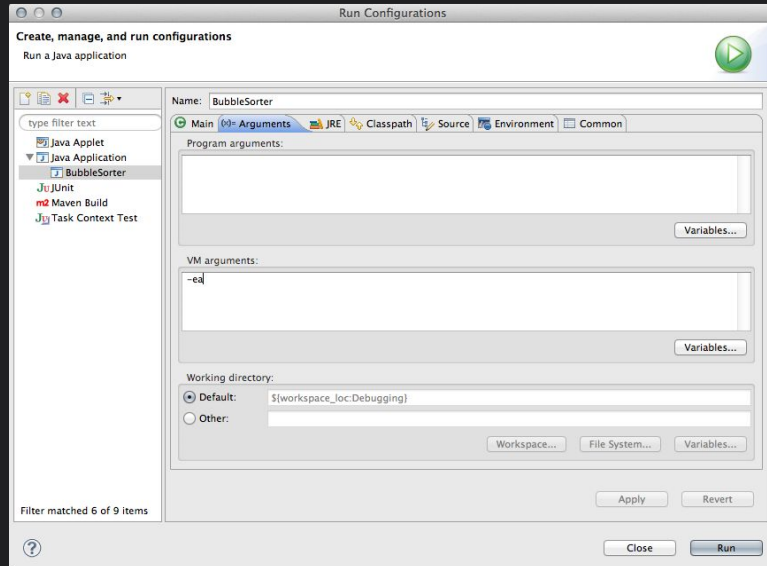- Do NOT use to perform **necessary** operations

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Enabling Assertions

- Assertions are not enabled by default
  - Require **–ea** (enable assertions) flag when running

- Two methods for enabling in Eclipse
  - Always enable assertions for all Java projects
  - Only enable assertions for certain Java Projects

https://tutoringcenter.cs.usfca.edu/resources/enabling-assertions-in-eclipse.html

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Enabling Assertions

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Resources

Java Technotes

https://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html

Java SE 17 Language Specification

https://docs.oracle.com/javase/specs/jls/se17/html/jls-14.html#jls-14.9.2-120-A

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