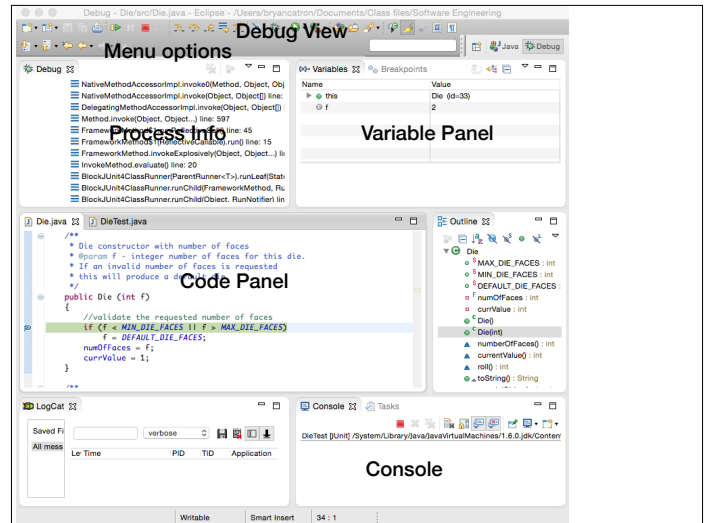


# Modern Debuggers





- Set “breakpoints”
- Examine variables
- Change variable values
- “Single-step” execution of program

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## Debugging

- “bug” icon will run program in Debug Mode 
- Might change your view - different panels shown
- Will run program until the first breakpoint
  - set at least one breakpoint before starting 
  - add / clear breakpoints as you execute the program
- Can single-step, etc (as needed) 
- Can resume - until next breakpoint 

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## Debugging

- Use the debugger!
  - WHENEVER your program misbehaves!
- Use the debugger!
  - Instead of awful `System.out.println` (“the value is...”)
- Use the debugger!
  - Watch your variables for unexpected values!

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## Debugging

Strategy when things go wrong

- You are not your code!
- Drop ALL your assumptions
- Divide and conquer
- Find location/situation that fails
- Write a test case for THAT situation
  - Fix it and confirm that it now works!

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## Testing

- Make many (different) test methods
  - Do this early
- NEVER erase good test cases
  - Keep them all! (Regression testing)
- Testing can prove the existence of bugs
  - Testing cannot prove the absence of bugs
  - Testing cannot prove the absence of bugs

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