DEBUGGING AND INDEFINITE LOOPS

CSSE 120—Rose Hulman Institute of Technology

Exam 1 Thursday Evening 7-9 PM

- See Schedule Page for location
- Allowed materials: See Session 10 PowerPoint slides.
- Bring laptop, network cable, and power cord to the exam
- No regular class meeting Thursday morning/afternoon
- Questions about exam?

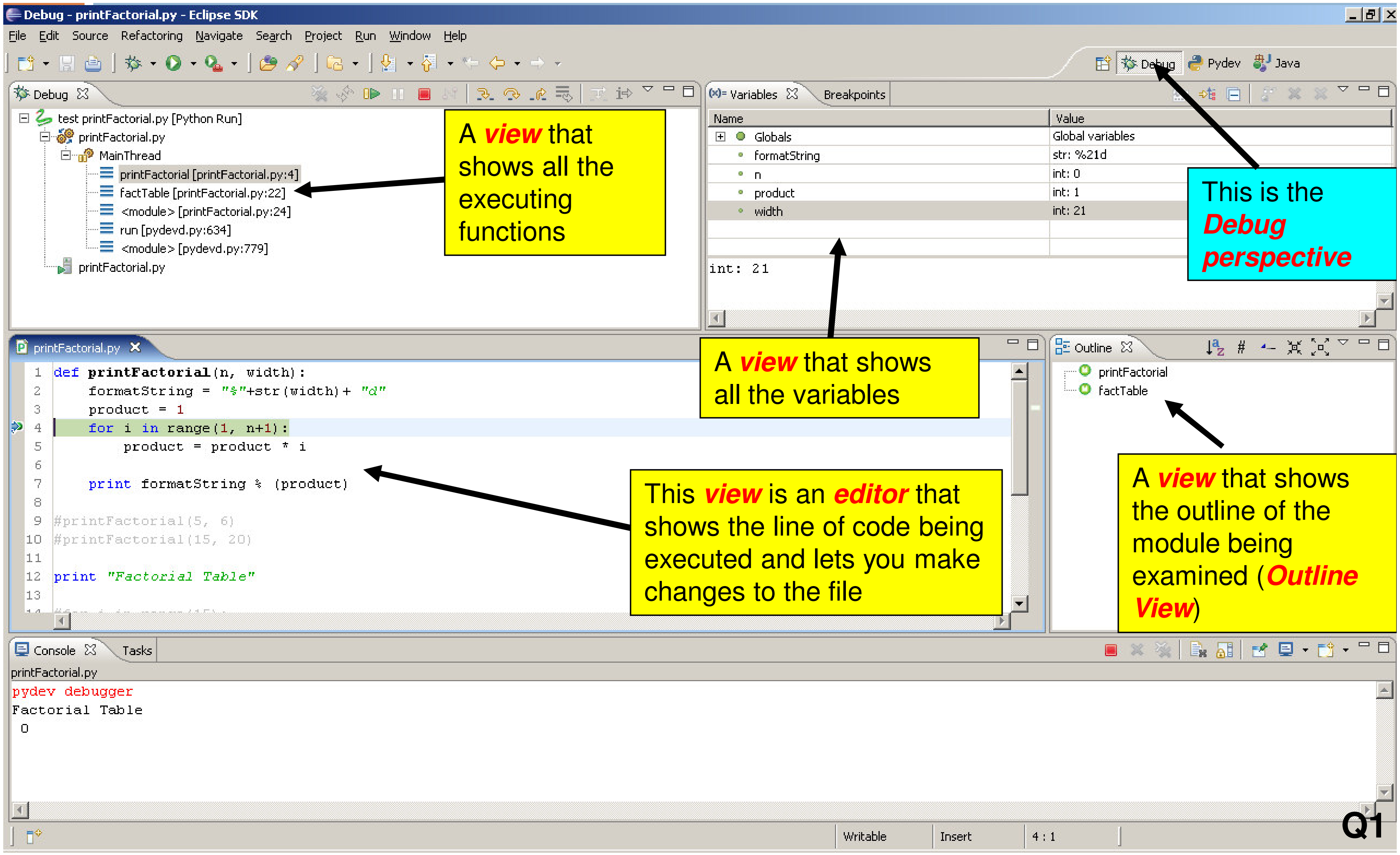
Debugging

- Debugging includes:
  - Discovering errors
  - Coming up with a hypothesis about the cause
  - Testing your hypothesis
  - Fixing the error
- Ways to debug
  - Insert print statements to show program flow and data
  - Use a debugger:
    - A program that executes another program and displays its runtime behavior, step by step
    - Part of every modern IDE

Using a Debugger

- Typical debugger commands:
  - Set a breakpoint—place where you want the debugger to pause the program
  - Single step—execute one line at a time
  - Inspect a variable—look at its changing value over time
- Debugging Example
  - Checkout the Session11 project from your repository and open factorialTable.py

Sample Debugging Session: Eclipse



Debug - printFactorial.py - Eclipse SDK
File Edit Source Refactoring Navigate Search Project Run Window Help
Debug Pydev Java
Debug
Variables Breakpoints
printFactorial.py
Outline
Console Tasks
Writable Insert 4 : 1

```
test printFactorial.py [Python Run]
  printFactorial.py
    MainThread
      printFactorial [printFactorial.py:4]
      factTable [printFactorial.py:22]
      <module> [printFactorial.py:24]
      run [pydevd.py:634]
      <module> [pydevd.py:779]
  printFactorial.py
```

Name	Value
Globals	Global variables
formatString	str: %21d
n	int: 0
product	int: 1
width	int: 21

```
int: 21
```

```
def printFactorial(n, width):
    formatString = "%"+str(width)+ "d"
    product = 1
    for i in range(1, n+1):
        product = product * i

    print formatString % (product)

#printFactorial(5, 6)
#printFactorial(15, 20)

print "Factorial Table"
```

```
printFactorial
factTable
```

```
printFactorial.py
pydev debugger
Factorial Table
 0
```

A ***view*** that shows all the executing functions

This is the ***Debug perspective***

A ***view*** that shows all the variables

This ***view*** is an ***editor*** that shows the line of code being executed and lets you make changes to the file

A ***view*** that shows the outline of the module being examined (***Outline View***)

Q1

Tips to Debug Effectively

- Reproduce the error
- Simplify the error
- Divide and conquer
- Know what your program should do
- Look at the details
- Understand each bug before you fix it
- Practice!

Use the scientific method:
•hypothesize,
•experiment,
•fix bug,
•repeat experiment

Q2

Review: Definite Loops

- Review: For loop
  - Definite loop: knows *before the loop starts to execute* the number of iterations of the loop body
  - Counted loop: sequence can be generated by range()
  - Example: Most for loops
- Syntax:
  - for <var> in <sequence>:

        <body>

Is This Loop a Definite Loop?

```
# Open the file
inputFile = open(inputFileName, 'r')

# Process each line of file
for line in inputFile:
    image = Image(imageCenter, line.rstrip())
    image.draw(win)
    time.sleep(delay)

win.getMouse()
inputFile.close()
win.close()
```

Indefinite Loops

- Number of iterations is not known when loop starts
- Is a conditional loop
  - Keeps iterating as long as a certain condition remains true
  - Conditions are Boolean expressions
- Typically implemented using **while** statement
- Syntax:

```
while <condition> :
        <body>
```

While Loop

- A *pre-test loop*
  - Condition is tested at the top of the loop
- Example use of while loops

  Nadia deposits $100 in a savings account each month. Each month the account earns 0.25% interest on the previous balance. How many months will it take her to accumulate $10,000?

- Open moneyDeposit.py in Eclipse Session 11

Q5

Infinite loops on purpose

- With for loops, we could make the program run for a really long time, but not forever.
- Create a very simple while loop that runs forever.

Break statement

```
x = 0
while True:
    x += 1
    print x ,
    if x > 10:
        break
```

Exercise: While Loops

- Open guessMyNumber.py in the Session11 project.
- Follow the instructions there and demo your program to your instructor or an assistant when you finish.
- Commit your work

- When you are done, please start HW11.