

# Computing Basics

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With

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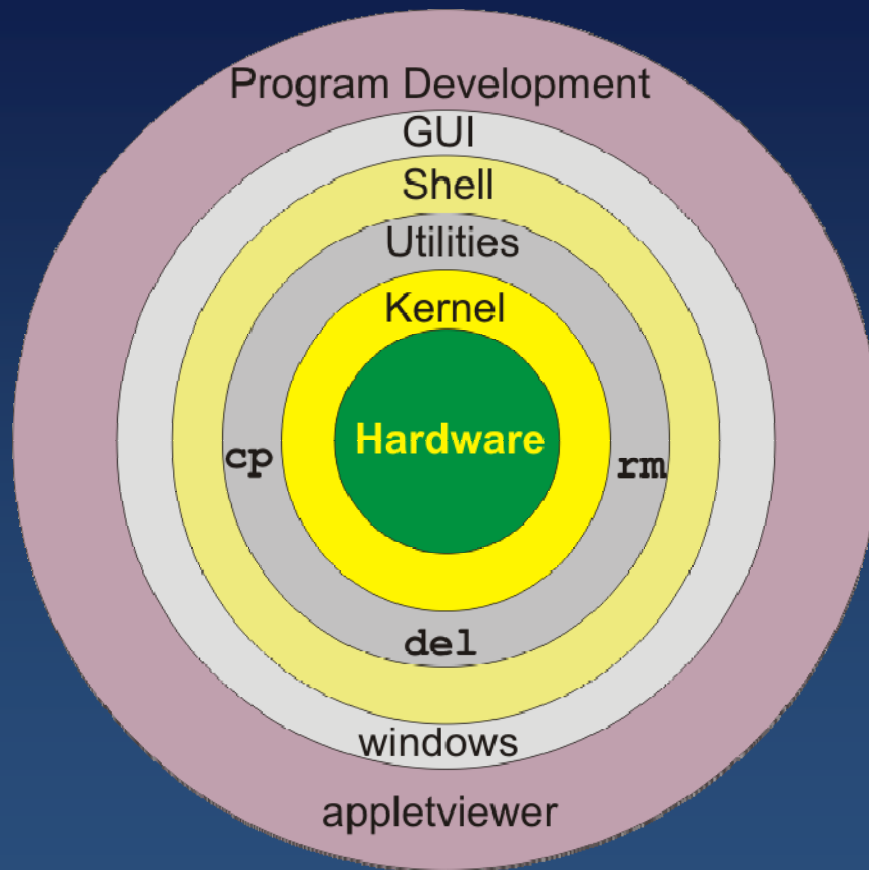
Computational Physics for Undergraduates

BS Degree Program: Oregon State University

*“Engaging People in Cyber Infrastructure”*

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# Computers Do Exactly as Told



- Tell them exactly, everything
- Programs: explains all
- Understand: in control
- Computers: *basic machine language*
- Scientists: *high level*  
*Problem solving environment*
- *Shell = command-line interpreter*
- *Operating systems*
- *GUI, Kernel*

# Types of High-Level Languages

- ◆ Problem Solving Environments
  - far from hard/software, algorithms
- ◆ Compiled (Fortran, C)
  - translates entire program to basic ML
  - all at one time, fast
  - Translates via rules & dictionary
  - $\Rightarrow$  *object code* (not for humans)
- ◆ Interpreted language (BASIC, Maple)
  - Translate 1 statement at a time
  - more immediate response, friendly, slow
- ◆ Java: mixed bag, universal, portable

# Programming Concepts

## (programming assumed)

### *Pseudocode*

```
calculate area of circle           // Do this, computer!
```

### *Not specific enough*

```
read radius                        // Input
calculate area of circle           // Numeric
sprintf area                        // Output
```

### *Specifies algorithm*

```
read radius                        // Input
// calculate area of circle        // Comment
pi = 3.141593                      // Set constant
area = pi * radius^2               // Algorithm
print area                          // Output
```

# Java Implementation

```
public class CircleArea           // Begin class           1
{
    public static void main(String[] args) // Begin main           2
    {
        double radius, circum, area, PI; // Set precision           3

        radius = 1.; // Assign radius           4

        PI = Math.PI;           5

        circum = 2.* PI * radius; // Calc circum           6

        area = radius * radius * PI; // Calc area           7

        System.out.println("Circum = "+circum +" Area = "+area); // End main           8
    } // End main           9
} // End class           10
```

# **Time for Exercises** **in Lab**

# *Welcome to our first Computer Lab session*

- ◆ We discuss a few interesting exercises
- ◆ See class page for specific assignment
- ◆ Details, more exercises in text
- ◆ You work on own or with local instructor
- ◆ Meant to be “lab”, *i.e.* experiments on computer
- ◆ No one “correct” answer

# Exercise: Shells, Editors, Programs

1. Create folder/directory "CSE"
  - a. create subdirectories for each week
2. Enter (editor) `area.c`, `areas.f` or `Area.java`
  - a. Save file
3. Compile and execute `Area`
4. Check program; `r=1.`, `r=10.`
5. Experiment: `r = 1`, `r =`, `r = a`
6. Use scanner (j2se/1.5.0): keyboard input
7. Output to file
8. Revise: main for I/O, method for calculation