

C Fundamentals

C vs. Java: Design Goals

- Java design goals
 - Support *object-oriented* programming
 - Allow program to be executed on *multiple operating systems*
 - Support using *computer networks*
 - Execute code from *remote sources securely*
 - Adopt the good parts of *other languages* (esp. C and C++)
- Implications for Java
 - Good for *application-level* programming
 - High-level
 - Virtual machine insulates programmer from underlying assembly language, machine language, hardware
 - Portability over efficiency
 - Security over efficiency
 - Security over flexibility

C vs. Java: Design Goals

- C design goals
 - Support **structured** programming
 - Support **development of the Unix OS** and Unix tools
 - As Unix became popular, so did C
- Implications for C
 - Good for **system-level** programming
 - But often used for **application-level** programming – sometimes inappropriately
 - **Low-level**
 - Close to assembly language; close to machine language; close to hardware
 - **Efficiency over portability**
 - **Efficiency over security**
 - **Flexibility over security**

C vs. Java: Design Goals

- Differences in design goals explain many differences between the languages
- C's design goal explains many of its eccentricities
 - We'll see examples throughout the course

“Circle” Program

- File circle.c:

```
#include <stdio.h>
int main(void)
/* Read a circle's radius from stdin, and compute and write its
   diameter and circumference to stdout.  Return 0. */
{
    int radius;
    int diam;
    double circum;
    printf("Enter the circle's radius:\n");
    scanf("%d", &radius);
    diam = 2 * radius;
    circum = 3.14159 * (double)diam;
    printf("A circle with radius %d has diameter %d\n",
           radius, diam);
    printf("and circumference %f.\n", circum);
    return 0;
}
```

Building and Running

- To build (preprocess, compile, assemble, and link):

```
$ gcc circle.c -o circle
```

- To run:

```
$ ./circle
Enter the circle's radius:
5
A circle with radius 5 has diameter 10
and circumference 31.415900.
```

Typed by
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