CSE / ENGR 142 Programming I

Style

Programming Style

- A program is a document:
  - Some of it is read by a computer.
  - ALL of it is read by people.
  - Donald Knuth: "literate programming"
- "Style" is a catch-all term for people-oriented programming.
  - comments, spacing, indentation, names
  - clear, straightforward, well-organized code
  - code quality

/* Comments */

Comment block at front of program

```
/*************************************************************
 * Program:   Mi_To_Km
 * Purpose:   Miles to kilometers conversion
 * Author:    A. Hacker, 1/18/00  Section AF (Turing)
 *************************************************************/
```

Comment block per major section

small ones throughout

```
/* Calculate volume of cylinder and ...
 * Inputs:     radius, height, ...
 * Output:     volume, ...
 * Assumes:    radius, height nonnegative */
 .
 .
 .
/* Tell user it's negative. */
```


Comments

- Say *why*, not *what*:
  - NO: /* subtract one from sheep */
    sheep = sheep - 1;
  - YES: /* account for the sheep that the big bad wolf just ate. */
    sheep = sheep - 1;

Spaces

- Use blank lines to separate major sections.
- Vertically align like things:

```
x       = 5 ;
y_prime = 7 ;
z_axis  = 4.3;
```

- Leave space around operators:

```
No:     y=slope*x+intercept;
Yes:    y = slope * x + intercept ;
```

Use parentheses for emphasis, too

```
Yes:    y = (slope * x) + intercept ;
```

Indentation
Like an outline, indent subordinate parts.

Identifiers (Review)

- Identifiers name variables and other things
  - Letters, digits, and underscores (_)
  - Can't begin with a digit
  - Not a reserved word like *double*, *return*
- "Case-sensitive"
  - *VAR*, *Var*, *var*, *vAr* are all different
- Using all CAPITAL letters is legal
  - but usually reserved for *#define* constants

What's in a Name?

- Extremely valuable documentation.
- Microsoft Excel has over 65,000 variables.
- How long is just right?
  - *m*
  - *mph*
  - *miles_per_hour*
  - *average_miles_per_hour_that_the_car_went_before_noon*
- Avoid similar names: *mph* vs. *Mph* vs. *mqh*

Clarity

Do "obvious" things the obvious way

No: *x = (y = x) + 1 ;*

Yes: *y = x ;*
x = x + 1;

Don't be tricky, cute, or clever without GOOD reason.

If so, comment it!

#define

Named constants:

```
#define PI              3.14159265
#define AVOGADRO        6.02e23
#define LINE_WIDTH      80
#define FIELD_WIDTH     10
#define FIELDS_PER_LINE (LINE_WIDTH / FIELD_WIDTH)
...
area = PI * radius * radius ;
lines = fields / FIELDS_PER_LINE ;
```

no = no ;

Notes:

yes UPPER CASE

yes ( )

Why #define?

- Centralize changes
- No "magic numbers" (unexplained constants)
  - in the use good names instead
- Avoid typing errors
- Avoid accidental assignments to constants

```
double pi ;
pi = 3.14 ;
...
pi = 17.2 ;
```

vs.

```
#define PI 3.14
...
PI = 17.2 ;   <-- syntax error
```


Putting It All Together

```
/* Convert miles per hour to feet per second
 * Author: ...
 * Date:   ...
 */

#include <stdio.h>

/* conversion constants. */
#define FEET_PER_MILE       5280.0
#define SECONDS_PER_HOUR    (60.0 * 60.0)

int main(void)
{
  double miles_per_hour;        /* input mph */
  double feet_per_second;       /* corresponding feet/sec */
  double feet_per_hour;         /* corresponding feet/hr  */

  /* prompt user for input */
  printf("Enter a number of miles per hour: ");
  scanf("%lf", &miles_per_hour);

  /* convert from miles per hour to feet per second */
  feet_per_hour = miles_per_hour * FEET_PER_MILE;
  feet_per_second =

    eet_per_hour / SECONDS_PER_HOUR;

  /* format and print results */
  printf("%f miles per hour is equal to %f feet per "
         "second.\n", miles_per_hour, feet_per_second);

  return(0);
}
```


Many small points; Big cumulative effect...

```
#include<stdio.h>
int main(void){double v1,v2,v3,v4,v5;pr\
intf("Enter a number of miles per hour:\
");scanf("%lf",&v1);v5=v1*14.6666667;pr\
intf("%f miles per hour is equal to %f \
feet per second.\n",v1,v5);return(0);}
```

Style Summary:
Clarity is Job #1

- DO
  - Use plenty of comments
  - Use white space
  - Use indentation
  - Choose descriptive names
  - Use named constants
- DON'T
  - be terse, tricky
  - place speed above correctness, simplicity
  - use "magic numbers"

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