

Programming with C I

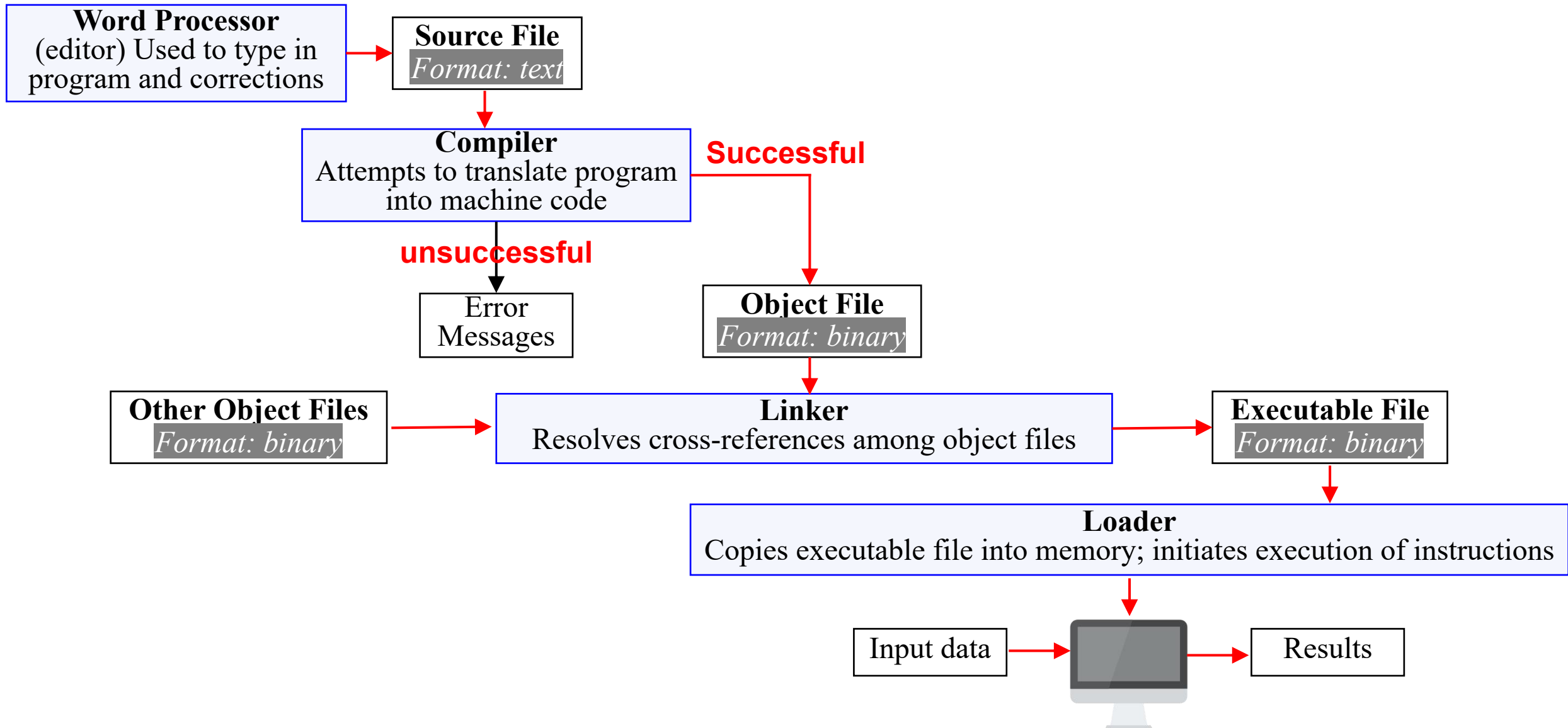
Fangtian Zhong
CSCI 112

Gianforte School of Computing
Norm Asbjornson College of Engineering
E-mail: fangtian.zhong@montana.edu

C

- A high-level programming language.
- Developed in 1972 by Dennis Ritchie at AT&T Bell Labs.
- Designed as the language to write the Unix operating system.
- Resembles everyday English.
- Very popular.

Entering, Translating and Running a High-Level Language Program



Language Elements

preprocessor

- a system program that modifies a C program prior to its compilation.

library

- a collection of useful functions and symbols that may be accessed by a program.
- each library has a standard header file whose name ends with the symbols “.h”.

stdio.h

Language Elements

preprocessor directive

- a C program line beginning with # that provides an instruction to the preprocessor.

```
#include <stdio.h>
```

```
#define KMS_PER_MILE 1.609
```

Language Elements

constant macro

- a name that is replaced by a particular constant
- value before the program is sent to the compiler

```
#define KMS_PER_MILE 1.609
```

constant



constant macro



```
kms = KMS_PER_MILE * miles;
```

Language Elements



comment


- text beginning with `/*` and ending with `*/` that provides supplementary information but is ignored by the preprocessor and compiler.
- for single-line comments, can use `//`

```
/* Get the distance in miles */  
// Get the distance in miles
```

Function main

 Every C program has a main function.

```
int main (void)
```

 These lines mark the beginning of the main function where program execution begins.

Function main



declaration

- the part of a program that tells the compiler the names of memory cells in a program.



executable statements

- program lines that are converted to machine language instructions and executed by the computer.

Variable Declarations

- 🛡️ C requires you to declare every variable used in a program.
- 🛡️ A variable declaration begins with an identifier that tells the C compiler the type of data store in a particular variable.

```
int hours;
```

```
double miles;
```

Data Types

int

- a whole number
- 435





double

- a real number with an integral part and a fractional part separated by a decimal point
- 3.14159

char

- an individual character value
- enclosed in single quotes
- 'A', 'z', '2', '9', '*', '!'

Executable Statements

-  Follow the declarations in a function.
-  Used to write or code the algorithm and its refinements.
-  Are translated into machine language by the compiler.
-  The computer executes the machine language version.

Executable Statements





assignment statement

- an instruction that stores a value of a computational result in a variable



```
kms = KMS_PER_MILE * miles;
```

Executable Statements

-  The expression to the right of the assignment operator is first evaluated.
-  Then the variable on the left side of the assignment operator is assigned the value of that expression.

```
sum = sum + item;
```

The **printf** Function

-  Displays a line of program output.
-  Useful for seeing the results of a program execution.

```
printf("That equals %f kilometers. \n", kms);
```

The **printf** Function



function argument

- enclosed in parentheses following the function name
- provides information needed by the function

```
printf ( “That equals %f kilometers. \n” , kms);
```

function name

The **printf** Function



format string

- in a call to **printf**, a string of characters enclosed in quotes, which specifies the form of the output line

```
printf (“That equals %f kilometers. \n”, kms);
```

The **printf** Function

print list

- in a call to **printf**, the variables or expressions whose values are displayed

placeholder

- a symbol beginning with % in a format string that indicates where to display the output value

```
printf("That equals %f kilometers. \n", kms);
```

Formatting Numbers in Program Output



field width

- the number of columns used to display a value



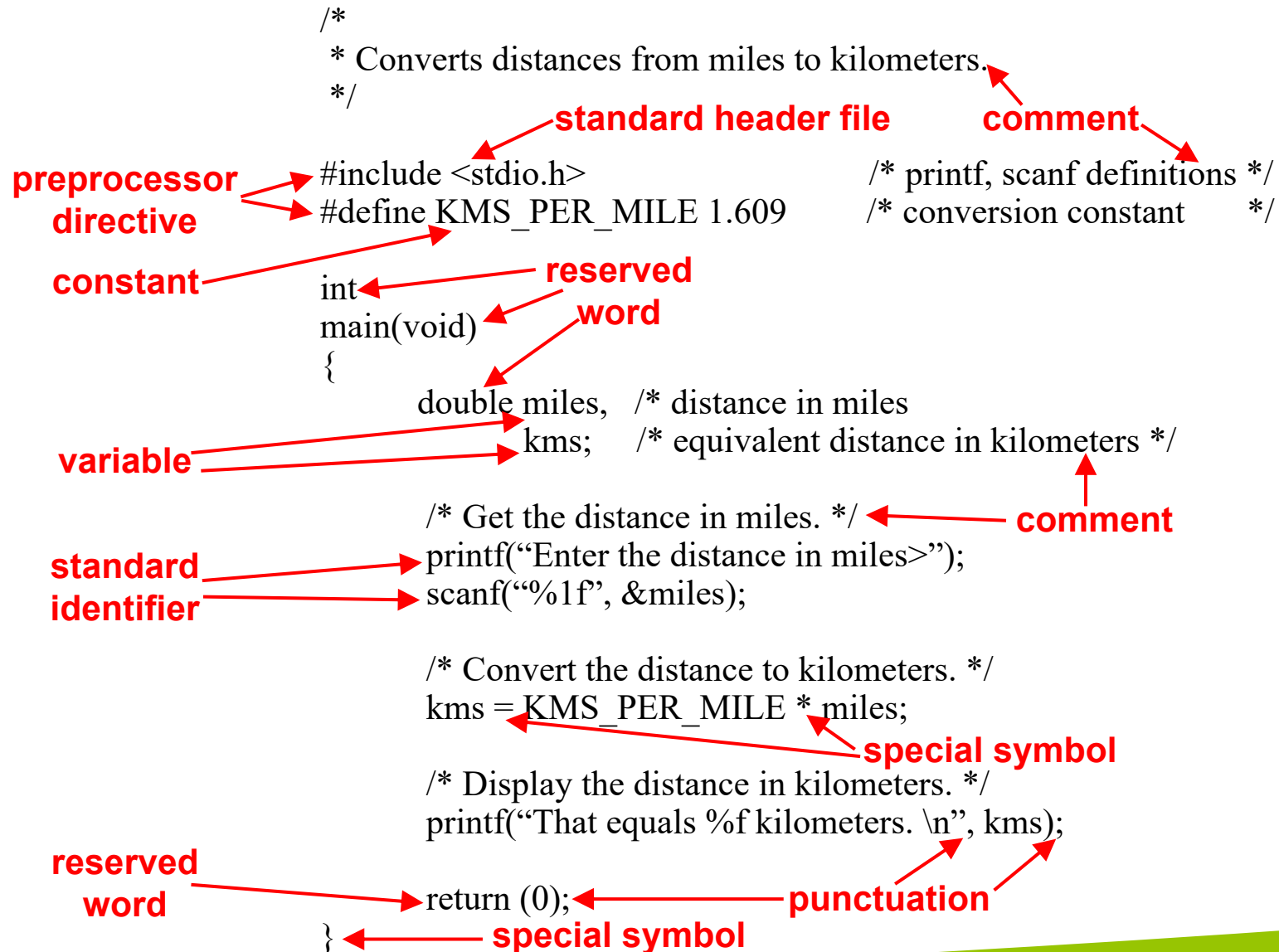
No. of decimal places

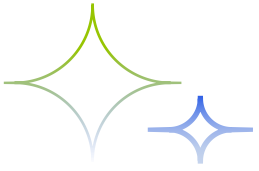


When formatting doubles, you may indicate the total field width needed and the number of decimal places desired.

```
printf("Your result equals %5.1f kilometers. \n", kms);
```

C Language Elements in Miles-to-Kilometers Conversion Program





THE END

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