Week 2 - Binary Numbers, Design Tools; Fundamentals of 'C++'
Reading Assignment from text: 2-3 -> 2-16

Binary Numbers
The student will learn to convert both whole numbers and numbers with fractional parts from base 2 to base 10 and vice versa. The purpose is for the student to understand the following basic computer terminology.

1. Where do "magic numbers" such as 512 come from? Why only 256 possible characters in the ASCII code?

2. What does the computer give back 0.009999 when you gave it 0.01?

3. Why does it matter to declare something as float vs. int?

4. Why does it matter to declare something as double vs. float?

N.B. When binary number presentation is complete you will be asked to complete and submit a binary worksheet.

Design Tools
Design tools include hierarchy chart, pseudocode, and flowchart.

Comments
Single line comment begins with //

```
//Carpet Cost Program
//Hands-On Assignment
```

Multiple lines begin with /* and end with */

```
/*Carpet Cost Program
Hands-On Assignment
Completed in groups */
```

Identifiers
Identifiers must adhere to the following rules:
1. Alphanumeric characters plus the underscore only.
2. First character must be alpha or the underscore (save the underscore for system libraries)
3, Fewer than 64 characters in length
4. May not be a 'C++' keyword (see ASCII Character file)
('C++' is case sensitive meaning happytimes is not the same as happyTimes)

Variables: identifiers with a type

Variable declaration:

```
int number, extra;
```

Variable initialization

```
float avg, sum = 0; //only sum is zero
```

Table 2-6 Integer Data Types, Sizes, and Ranges

Data Type	Size	Range
`short`	2 bytes	–32,768 to +32,767
`unsigned short`	2 bytes	0 to +65,535
`int`	4 bytes	–2,147,483,648 to +2,147,483,647
`unsigned int`	4 bytes	0 to 4,294,967,295
`long`	4 bytes	–2,147,483,648 to +2,147,483,647
`unsigned long`	4 bytes	0 to 4,294,967,295

Category	Type	C Implementation
Void	void	void
Integral	Boolean	bool
	Character	char
	Integer	short int, unsigned int, int, unsigned int, long int, unsigned long int
Floating	Real	float, double
	Imaginary	
	Complex	

Constants can be divided into four categories and three types
Categories:
1. String Constants: "Welcome to C++ programming"
2. Single character Constants: 'A', '\n' (note special ones on page 35)
3. Integer constants (int by default) 65490, 13, 58909876L, 257U
4. Real constants (double by default) 30.1415f, 3.14159, 1234.

Types

1. Literal	x = 1.73;
2. Defined (preprocessor)	#define SHIPPING 5.60f
3. Memory	const double pi = 3.141592;