COS126: General Computer Science
&
COS128: General Computer Science (Honors)

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Sanjeev Arora
Andrea LaPaugh

Computer Science The Science of :
(i) storing and manipulating "information"
(ii) Designing and Building Systems that do (i)
(computers, networks, internet...)

basic tenets:

- formal specifications
- hierarchichal design (complicated systems built on top of simpler systems)

This Course:

- Introduction to programming (via C programming language)
- "Survival Training" for the information age ("What is a CPU?" "What is virtual memory?" "Why do I care?")

- **Elegant intellectual ideas (recursion, fractals, information coding, system simulation...)**

Difference between COS126/128:

128 is meant for students who know how to program in a high-level language (C/Pascal /Scheme)

C program to compute the sum of the integers from 1 to n

```
#include<stdio.h>
void main()
{ int i, n, sum;

   sum = 0;
   printf("Input the integer\n");
   scanf("%d", &n);
   i =1;
   while(i <= n)
        {
          sum = sum + i;
          i = i+1;
        }
```

i = i+1 and other counterintuitive things

- i=i+1 means: take the current value of i, add 1 to it and make that the new value of i

the statement 5 = 5 is an error!

- a 3-line "while" statement can do n operations

Anatomy of a C program

```
#include<stdio.h>
void main()
{ int i, n, sum;

   sum = 0;
   printf("Input the integer\n");
   scanf("%d", &n);
   i =1;
   while(i <= n)
        {
          sum = sum + i;
          i = i+1;
        }
   printf("The sum is %d", sum);
}
```

Buzzwords...

(warning: see reader + text for full details)

Constants: Things like 0, 1, 2, ..,

Variables: ``Element "of information that can be operated upon. Typically named with a sequence of letters ("`i`", "`sum`", "`classaverage`")

every Variable has a Type: `integer, float, char`
(Note: advanced types , such as video, sound etc. are not available)

Operators:

arithmetic

+	(addition)
*	(multiplication)
/	(division)

relational

<	(less than)
>	(greater than)
==	(is equal to)
<=	(is less than or equal to)

many others...

Buzzwords (contd.)

expressions: Meaningful combinations of variables, constants, operators, and parenthesis.

```
3+5;
3*(2 + 5);
(3*2) + 5;
(i <= n);
(sum + sum/5);
```

assignment operator: (denoted =)
usage: *`variable = expression;`*

control structures:

while, for: allow program to repeat an action many times.

if : allows program to test for certainconditions

switch : a multi-way if

more on control structures

for and while can substitute for each other

```
i=1;
while(i <=n)
 {
   sum= sum +i;
   i = i+1;
 }
```

```
for(i=1; i<=n; i=i+1)
{
   sum= sum +i;
}
```


program to sum the first n integers

(uses `if` and `for`)

```
#include<stdio.h>
void main()
{ int i, n, sum =0;

   printf("Input the integer\n");
   scanf("%d", &n);
   if (n <1)
        {
        printf("Input a positive integer");
        }
   else
        {
          for(i=1; i<=n; i=i+1)
          {
             sum= sum +i;
          }
        printf("The sum is %d", sum);
        }
}
```

A Brief History

1930s and 1940s: "Armchair" invention of the concept of a universal computing machine (Turing, Church, ..)

1940s and 1950s: Early computers (vacuum tubes)

1960s: Transistors; Age of the mainframe computers

early 1970s: VLSI; mini and micro computers extensively used in academia and industry.

Invention of C and Unix, keyboards, video terminals.

late 1970s: Invention of the PC. C and Unix become industry standards.

1980s : PCs used widely in home and office; Workstations in academia; and supercomputers in big labs.

1990s: Even more PCs; Internet is everywhere.

This course: a guide to the next few weeks

This week (week 0):

- Purchase course readings from Pequod
- Purchase Kernighan-Ritchie's book from U-Store
- Start reading the "*Survival Guide*."
- Go to 30min "Getting Started" session on Tues/Wed/Thurs and do Problem Set # 0.

Week 1:

- figure out basics of programming (`if, while, for`).
- Problem Set # 1 due: Wed. the 14th.

By middle of Week 2:

- Read first two chapters of the reader
- Problem Set # 2 due: Wed the 21st

(additional instructions will be given in the classes)