CS 180 - Intro to C++

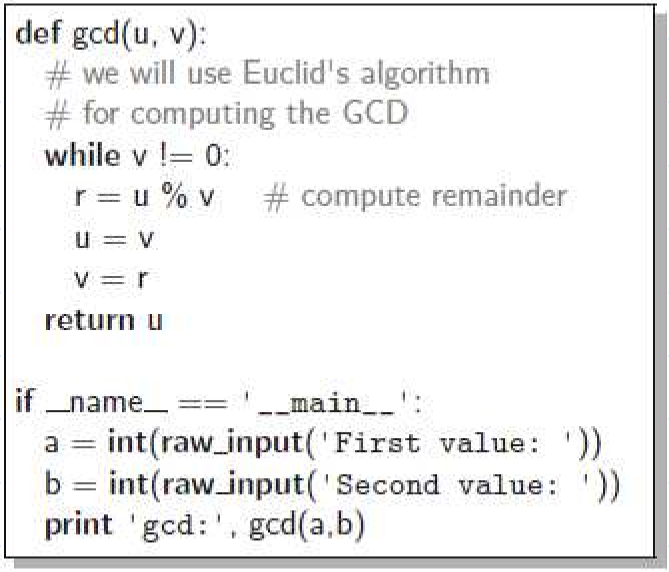
Note Title 8/20/2010

Announcements

- HW 1 out - due next Wednesday by 10am

A comparison:

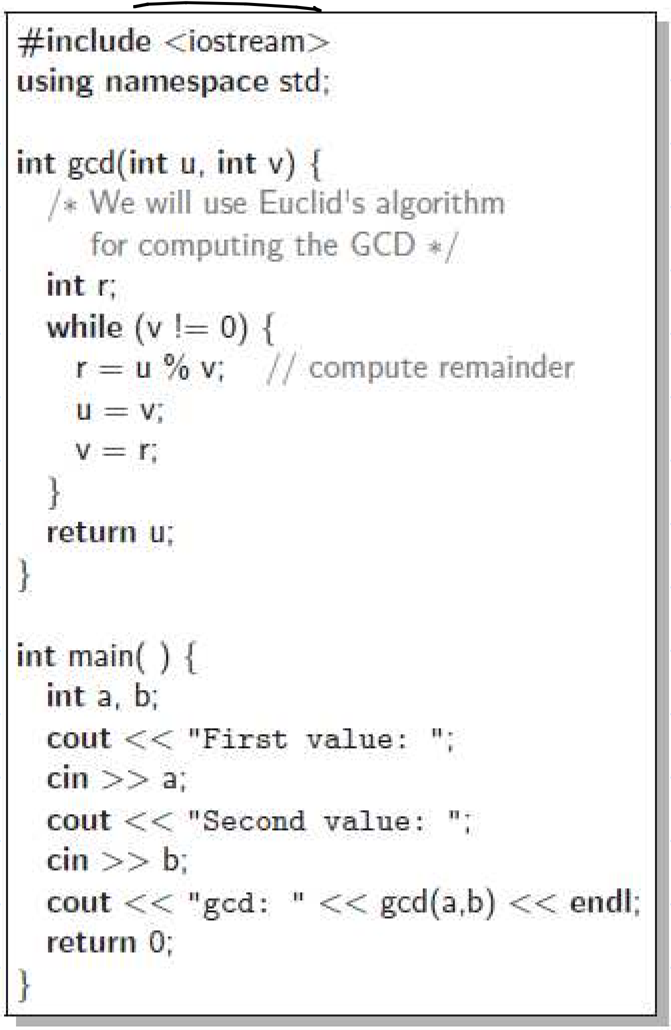
Python



```
def gcd(u, v):
  # we will use Euclid's algorithm
  # for computing the GCD
  while v != 0:
    r = u % v     # compute remainder
    u = v
    v = r
  return u

if __name__ == '__main__':
  a = int(raw_input('First value: '))
  b = int(raw_input('Second value: '))
  print 'gcd:', gcd(a,b)
```

C++:

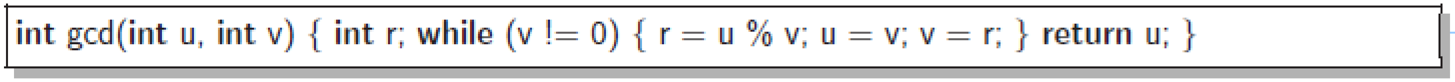


```
#include <iostream>
using namespace std;

int gcd(int u, int v) {
  /* We will use Euclid's algorithm
     for computing the GCD */
  int r;
  while (v != 0) {
    r = u % v;    // compute remainder
    u = v;
    v = r;
  }
  return u;
}

int main( ) {
  int a, b;
  cout << "First value: ";
  cin >> a;
  cout << "Second value: ";
  cin >> b;
  cout << "gcd: " << gcd(a,b) << endl;
  return 0;
}
```

White space is irrelevant!



```
int gcd(int u, int v) { int r; while (v != 0) { r = u % v; u = v; v = r; } return u; }
```

Python used returns & indentation to separate commands & loops.

(Please continue to indent!)

- ; in C++ is like a return in Python
- {} tell what is inside a loop, function,...

Executing code

In Python, we could save the code as gcd.py & then type "python gcd.py" to run it.

In C++:

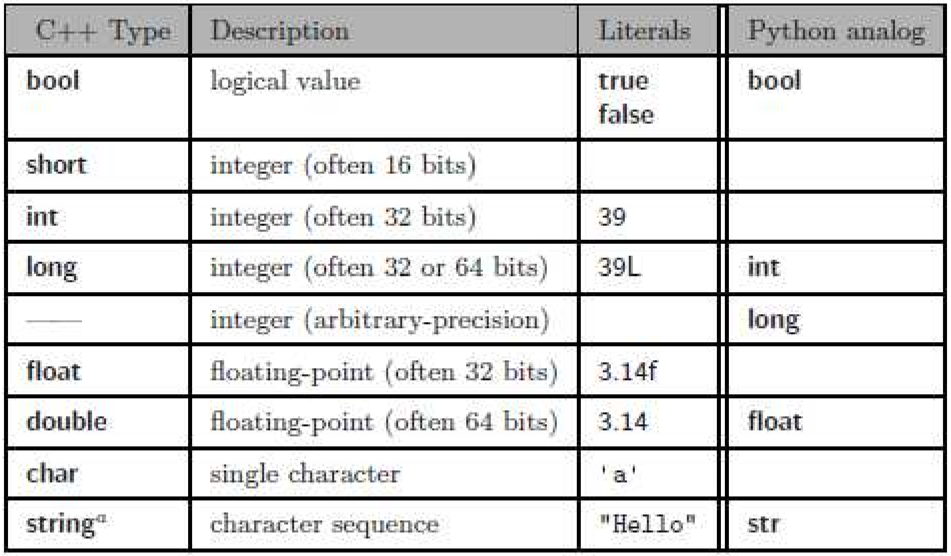
- Save as gcd.cpp

program that complies

Compile - - type "g++ -o gcd gcd.cpp"

run program - - type "./gcd"

Data Types



C++ Type	Description	Literals	Python analog
bool	logical value	true false	bool
short	integer (often 16 bits)		
int	integer (often 32 bits)	39	
long	integer (often 32 or 64 bits)	39L	int
——	integer (arbitrary-precision)		long
float	floating-point (often 32 bits)	3.14f	
double	floating-point (often 64 bits)	3.14	float
char	single character	'a'	
string[a]	character sequence	"Hello"	str

Data Types (cont.)

- Each integer type can also be unsigned.
  Instead of ranging from $-(2^{b-1})$ to $(2^{b-1}-1)$ goes from 0 to $2^{b}-1$.

int number; ← go up to $2^{31}-1$

unsigned int number2; $2^{32}-1$

Char versus string

```
char a;
 a = 'a';
 a = 'h';
```

chars use single quotes!

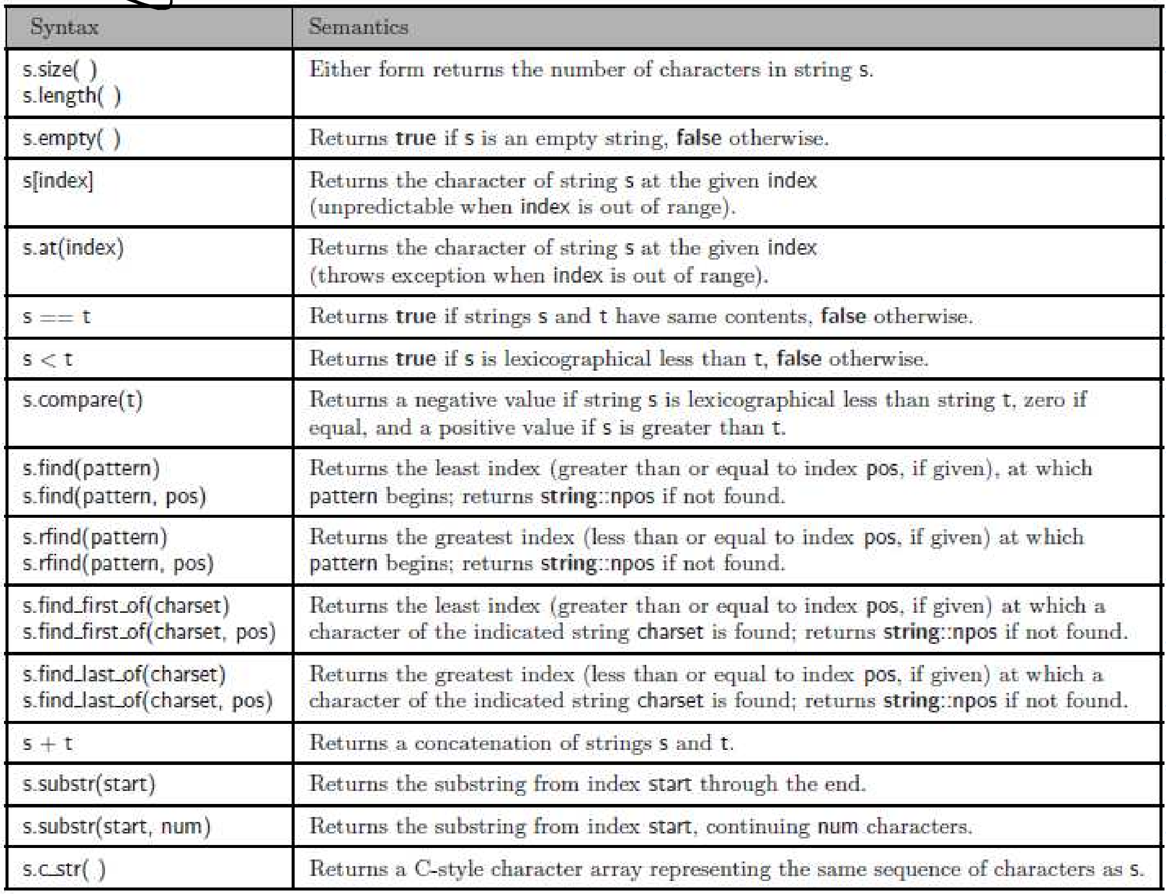
(import string library)

```
string word;
 word = "CS 180";
```

← double quotes

Strings are not automatically included! They are standard in most libraries, but need to import that library.

Strings



Syntax	Semantics

s.size( )
s.length( )
	Either form returns the number of characters in string s.

s.empty( )	Returns true if s is an empty string, false otherwise.
s[index]	Returns the character of string s at the given index (unpredictable when index is out of range).
s.at(index)	Returns the character of string s at the given index (throws exception when index is out of range).
s == t	Returns true if strings s and t have same contents, false otherwise.
s < t	Returns true if s is lexicographical less than t, false otherwise.
s.compare(t)	Returns a negative value if string s is lexicographical less than string t, zero if equal, and a positive value if s is greater than t.

s.find(pattern)
s.find(pattern, pos)
	Returns the least index (greater than or equal to index pos, if given), at which pattern begins; returns string::npos if not found.

s.rfind(pattern)
s.rfind(pattern, pos)
	Returns the greatest index (less than or equal to index pos, if given) at which pattern begins; returns string::npos if not found.

s.find_first_of(charset)
s.find_first_of(charset, pos)
	Returns the least index (greater than or equal to index pos, if given) at which a character of the indicated string charset is found; returns string::npos if not found.

s.find_last_of(charset)
s.find_last_of(charset, pos)
	Returns the greatest index (less than or equal to index pos, if given) at which a character of the indicated string charset is found; returns string::npos if not found.

s + t	Returns a concatenation of strings s and t.
s.substr(start)	Returns the substring from index start through the end.
s.substr(start, num)	Returns the substring from index start, continuing num characters.
s.c_str( )	Returns a C-style character array representing the same sequence of characters as s.