

FIRST C PROGRAM

CSSE 120—Rose Hulman Institute of Technology

Announcements



- **No class** Thursday/Friday
- Homework due Friday 5:00 pm:
 - ▣ Fill out team evaluation survey in Angel
- Homework due Session 22 (Monday/Tuesday)
 - ▣ Reading in C textbook

Using C with Eclipse

- We assume that you have already installed the MinGW compiler and C++ tools for Eclipse, as described in the Installation links from the course's Resources page on ANGEL
- You must use a different Eclipse workspace for your C programs than the one you use for Python programs. If you have not already created it,
 - ▣ In Windows explorer, create a folder to use for this
 - ▣ File → Switch Workspace, then the Browse button
 - ▣ Browse to the folder you created. Click OK

Don't change your repository structure



- You may be concerned that you have many folders on your repository, some for Python and some for C projects.
- Please don't move any folders on the repository!
 - ▣ We use scripts to automatically extract all homework assignments for grading, and they can't find your work that you move.
 - ▣ You wouldn't want to receive no grades for lots of good work done!
- Instead, they will be organized on your laptop into 2 Eclipse workspaces.

```
from math import *

def printRootTable(n):
    for i in range(1,n):
        print " %2d  %7.3f" % (i, sqrt(i))

def main():
    printRootTable(10)

main()
```

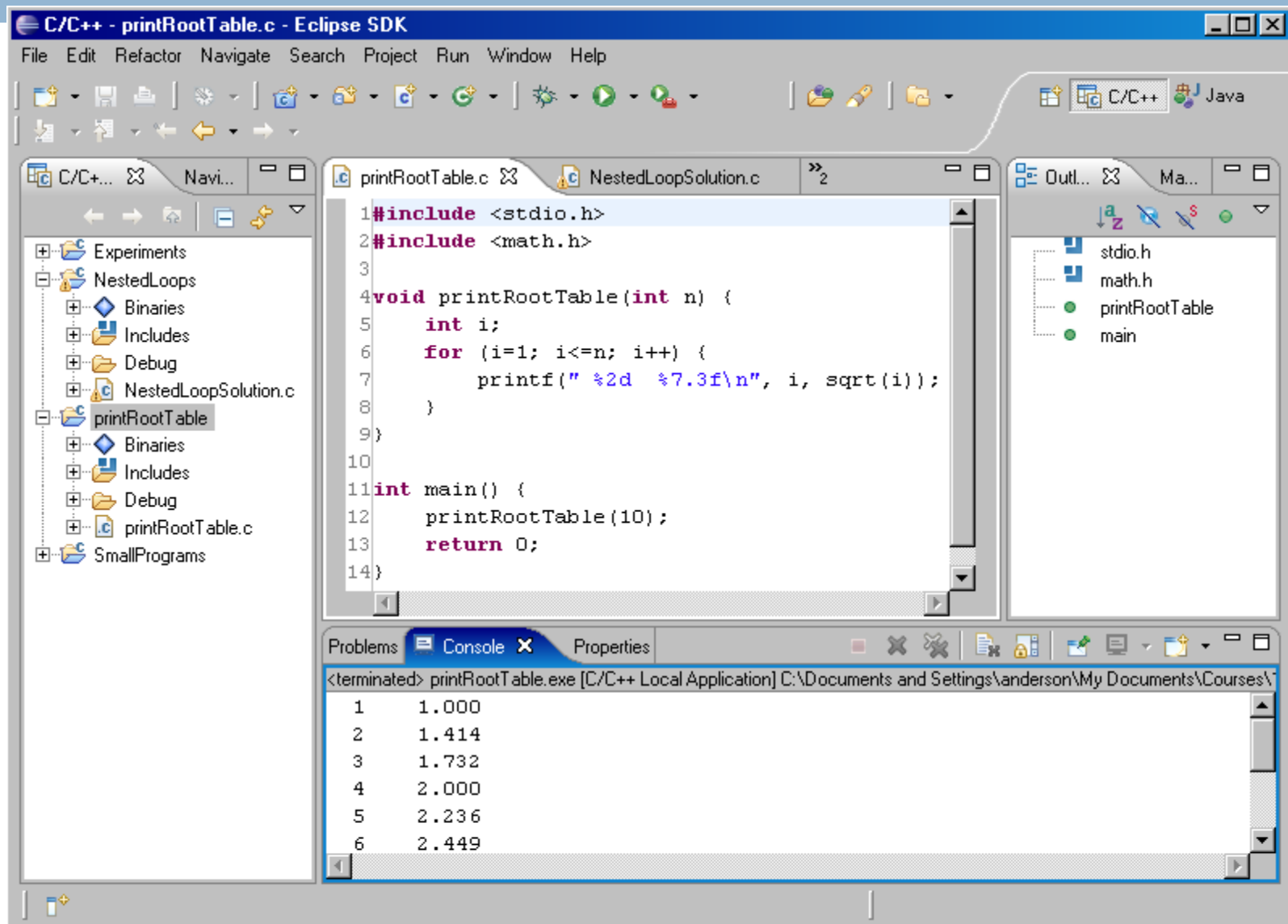
Parallel examples in Python and C.

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

void printRootTable(int n) {
    int i;
    for (i=1; i<=n; i++) {
        printf(" %2d  %7.3f\n", i, sqrt(i));
    }
}

int main() {
    printRootTable(10);
    return 0;
}
```

C/C++ perspective



Starting a New Project

- New → Project → C Project. Hello World ANSI C Project (Call it **RootTable**)
- Open src to find the file it created.
- Call the file **rootTable.c** . Finish.
- Note that if you right-click rootTable.c, **Run as ...** is missing from the context menu.
 - ▣ Why? unlike in PyDev, each Eclipse C Project must have exactly one code file containing the **main()** function.
 - ▣ Thus **Run As ...** is not even an option for an individual C code file.

Comments in C



- Python comments begin with `#` and continue until the end of the line.
- C comments begin with `/*` and end with `*/`.
- They can span any number of lines.
- Some C compilers (including the one we are using) also allow single-line comments that begin with `//`.

The inclusion of header files

`#include` is somewhat like Python's `from ... import *`

The most commonly included files are *header* files, whose names end with `.h`

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

angle brackets mean that it is a standard C header

If we include a file from our own project, surround it's name with quotes, as in `#include "myFile.h"`

A header file usually contains definitions of constants, and function signatures (without their bodies)

Two lines from `math.h` (we'll explain later):

```
#define M_PI 3.14159265358979323846  
double sqrt (double);
```

Other headers: <http://www.utas.edu.au/infosys/info/documentation/C/CStdLib.html>

Focus on the `main()` Function

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

Every C program must have a function named **main()**

`main`'s return value (In this case 0) is the exit status of the program. Usually, we return 0 to indicate successful completion of the program

This **main()** function has an empty formal parameter list

```
int main() {
    printRootTable(10);
    return 0;
}
```

In a function definition, we must indicate its return type before the name of a function, - In this case, the return type is **int**

The body of a function definition is enclosed in curly braces { ... }

Every simple C statement must be followed by a semicolon

The two statements in the body are just like corresponding Python statements

By looking at **main**, how can we tell that **printRootTable** doesn't have to return a value?

printRootTable()'s interface

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

void printRootTable(int n) {
```

What is the name of the "return type" of the printRootTable() function?
What does that mean?

The formal parameter is called **n**, its type is **int**

```
}
```

Note that this function has no **return** statement. In that case, the return type **must** be declared to be **void**

The type of every formal parameter must be declared

```
int main() {
    printRootTable(10);
    return 0;
}
```

As in Python, if there are multiple formal parameters, they are separated by commas

As in Python, when printRootTable is called, the value of the actual parameter (10) is used to initialize the formal parameter (n)

Notice that we do not provide the type of the actual parameter. Its type is the type of whatever value we pass in. It must "match" the type of the formal parameter

(local) variable declaration

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

i is a local (to the function) variable of the **printRootTable** function

```
void printRootTable(int n) {
    int i;
```

Its type is **int**

```
}
```

Unlike in Python, each C variable's and formal parameter's type must be declared before the variable can be used

```
int main() {
    printRootTable(10);
    return 0;
}
```

Variable declarations must include a type. An optional initialization is allowed, such as `int i = 17;` or `int i = n + 5;`

A local variable cannot have the same name as a formal parameter of the same function

Because the variables **i** and **n** are local to `printRootTable`, you cannot refer to them from anywhere else in the program

i++

- `i++` is an abbreviation for `i = i + 1`
 - ▣ which can also be written `i += 1`
- `i--` is an abbreviation for `i = i - 1`
 - ▣ which can also be written `i -= 1`
- Some C-programmers write `i++` or `i--` as part of a more complicated expression.
 - ▣ We suggest that you avoid doing that for now.

C's for loop

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

void printRootTable(int n)
{
    int i;
    for (i=1; i<=n; i++) {
        printf(" %2d  %7.3f\n", i, sqrt(i));
    }
}
```

Basic syntax is

```
for (<init>; <test>; <update>) {
    body
}
```

- **init:** usually initializes variables used by the loop
- **test:** if the value of the test is true, the loop body executes
- **update:** After execution of the loop body, this code is executed. Then the **test** code is evaluated again, and if true ...