Symbol Tables
what is a symbol table?

• One of the most important things a compiler keeps track of is the **symbols** in the program
  • What names are used for **variables**, **functions**, **structs**, **classes**, etc.

• One symbol table per **scope**
  • A scope is a region of a program where certain symbols are accessible (e.g., global, local to a function)
  • Scopes can be nested
    • Within a function, can access both local variables and global variables

```c
int x, y, z;
float z[20];
int ** p;
struct S {
    int x;
    float y;
} q;
```
What a symbol table keeps track of for each symbol depends on the symbol and the scope:

- **Variables**: name, type, size of variable (needed for allocating space)
  - If variable is global, may keep track of address, if local to a function, keep track of where in the activation record it is (where in a function’s stack frame)

- **Arrays**: name, type, size, number of elements

- **Functions**: name, return type, number and type of arguments

- **Structs**: name, types and sizes of variables

Note that symbols may refer to each other: e.g., variable type/size might be determined by a struct definition.

```c
int x, y, z;
float z[20];
int ** p;
struct S {
  int x;
  float y;
};
struct S q;
```
next: abstract syntax trees