Princeton University
COS 217: Introduction to Programming Systems
C Variable Declarations and Definitions

Variable **declaration**: A statement that informs the compiler of the name, type, scope, linkage, and duration of the variable.

Variable **definition**: A declaration that causes the compiler to allocate storage.

Scope (compiletime concept):

file:	The variable is accessible within the file in which it is declared, from the point of declaration to the end of the file.
block:	The variable is accessible within the block in which it is declared, from the point of declaration to the end of the block.

Linkage (linktime concept):

external:	The variable is known to the linker, and so is accessible from multiple files.
internal:	The variable is not known to the linker, and so is accessible from only the file in which it is declared.

Duration (runtime concept):

temporary:	The variable exists only during the execution of the function or block in which it is declared (i.e., the variable is stored in the runtime Stack).
process:	The variable exists throughout the entire process (i.e., the variable is stored in the Data or BSS Sections). The variable is initialized at program startup; the default initial value is 0.

C Code	Decl/Def	Scope	Linkage	Duration	Comment
`int a;`	definition	file	external	process	
`extern int b;`	declaration	file	external	process	
`static int c;`	definition	file	internal	process	
`void fun(int d)`	definition	block	internal	temporary	Common
`{`					
`    int e;`	definition	block	internal	temporary	Common
`    auto int f;`	definition	block	internal	temporary	Same as default
`    extern int g;`	declaration	block	(unknown)	process	Very rare
`    static int h;`	definition	block	internal	process	
`    ...`					
`}`					