Typedef | Coursera

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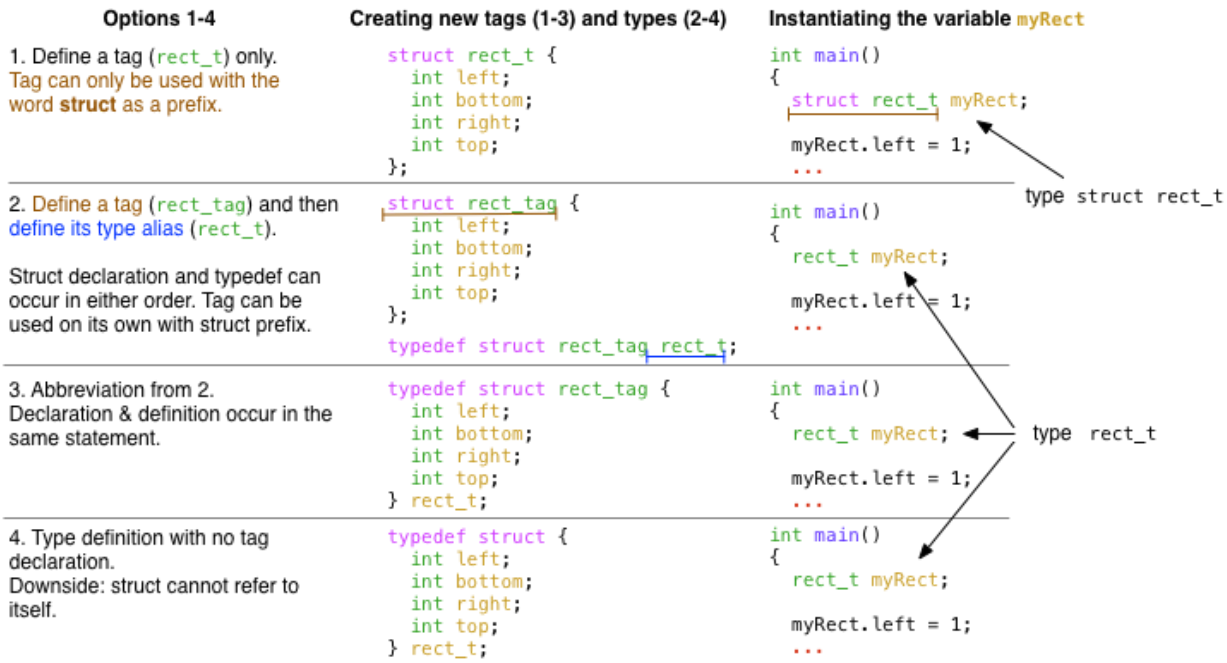


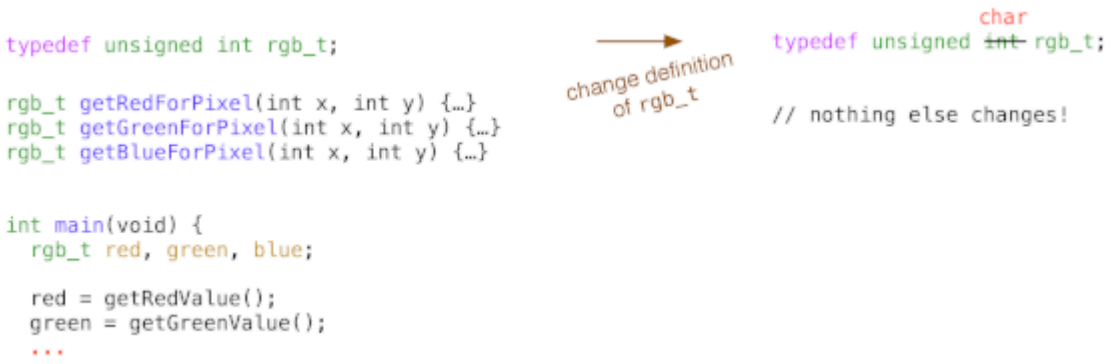
Many consider Option 1 in the figure above to be somewhat unwieldy, because the type of the variable includes the word struct in it. For example, suppose you wanted a function called shrinkRect that takes a rectangle as its input and returns a smaller rectangle as its output. Using the syntax of Option 1, the function would have the signature **struct rect_t shrinkRect(struct rect_t shrinkThisRectangle)**. Depending on how often you need to write out the type of the structure, this syntax can become cumbersome and make your code appear cluttered.

The solution to needing to type out “struct rect_t” every time you want to declare, pass, or use your new struct is to create a new data type that is explicitly of type struct. We do this using the keyword typedef. The exact syntax is shown in Option 2 above. The first lines declare the rect_tag struct in the same way as before. However, after this struct definition, the last line (typedef struct rect_tag rect_t;) is the declaration of the type “rect_t” which is defined as having the type “struct rect_tag”. Using "_tag" makes code easier to read and encourages the use of the type over the tag. Options 3 and 4 also “typedef” a new type, however, they both combine the typedef into a single statement with the structure declaration.

Although typedefs can simplify the use of structs, that is far from their only use. Any time that you are writing code in a specific context, typedefs can help you make your code more readable, by naming a type according to its meaning and use. For example, suppose you

are writing a program that deals with colors.

In the context of programming color characteristics, you might want to define a new data type for the colors in an RGB value. For example, you could create a new data type called rgb_t (which represents one of the red, green, or blue components of the color), that is of type unsigned int (because we know the values should be positive integers) and then declare variables red, green, and blue of type rgb_t. An example of this is shown on the left side of the figure below.



Typedefs provide a helpful abstraction for programmers. Instead of having to write "unsigned int" throughout her code, or frankly even think about the range of acceptable values in RGB representations, the programmer simply uses the custom type rgb_t and gives it no further thought.

Typedefs have another nice property of limiting the definition of a particular type to a single place in the code base. Suppose a programmer wished to conserve the space dedicated to variables and therefore wished to use an unsigned char instead of an unsigned int (after all, the values from 0 to 255 all fit within the 8-bits of an unsigned char). Without a typedef, this change would require a tedious and error-prone search of many (but by no means all—it may be used for variables unrelated to colors) instances of unsigned int throughout the code, changing these types to unsigned char. With a typedef, the programmer simply changes the single line of code in which rgb_t was defined (see the right side of the figure). No other code changes are required.

Heads up about typedef: The use of typedefs is somewhat controversial in some programming circles. In the context of structs, there are those who believe that it is important not to abstract the struct away from a type. They believe that programmers should always know when a particular variable is a struct and when it is not. Similarly, they believe that programmers should always be aware of the actual types of the data they use lest they fall prey to typing errors that could have been otherwise avoided. Use typedefs when the abstraction simplifies rather than obfuscates your code.