Math 157

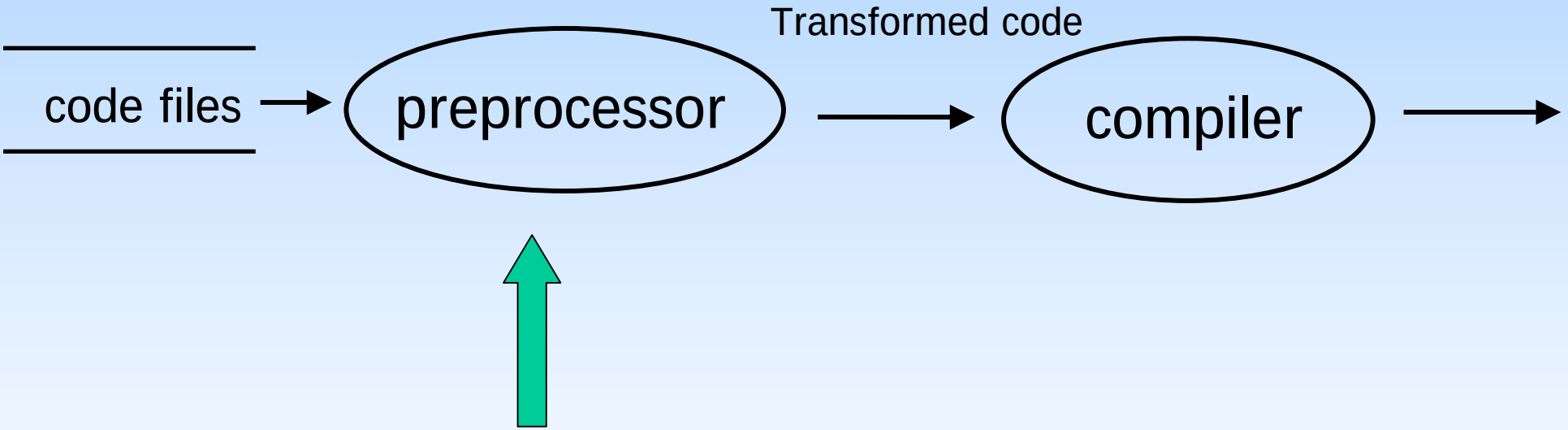
Preprocessor Directives

Feb. 25, 2009

Useful C/C++ Knowledge ...

Compiler Directives and the Preprocessor

When you invoke the compiler, you really invoke a preprocessor & the compiler



Reads “directives” in the code or from the command line and transforms the code files

A Partial List of Compiler Directives

#include “afile”

Inserts file afile into the code file

#define aVar aValue

Defines the symbol aVar to be aValue. In subsequent code processed, aVar is replaced by aValue (text replacement)

#define aVar

“defines” the symbol aVar

#undef aVar

“undefines” the symbol aVar

A Partial List of Compiler Directives Cont.

#ifdef aVar

If aVar is “defined” then the code between the #ifdef and #endif is evaluated by the preprocessor.

#endif

#ifndef aVar

If aVar is “undefined” then the code between the #ifndef and #endif is evaluated by the preprocessor

#endif

#defines specification

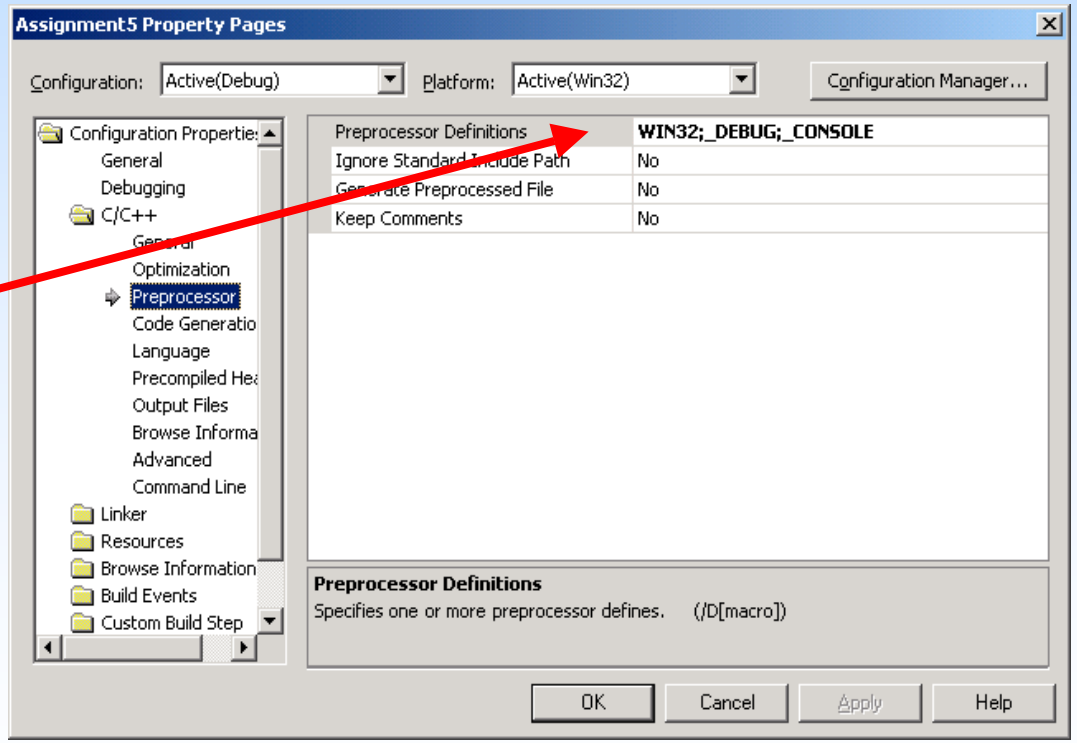
Preprocessor variables are defined and undefined

(A) In code using #define or #undef

(B) Externally using compiler options

(C) Pre-defined by the compiler

(B)



#defines specification cont.

(C) Pre-defined by the compiler

From the Microsoft C++ Documentation

(search __MSC_VER)

_MSC_VER : Defines the compiler version. Defined as 1200 for Microsoft Visual C++ 6.0 and ≥ 1300 for Microsoft Studio.net Always defined.

__cplusplus : Defined for C++ programs only.

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Typical uses of compiler directives ...

- To avoid multiple inclusion of class declarations
- To create “portable” code
- To enable conditional compilation :

  creating separate code versions for “debugging” and “release”

Example :

Avoiding multiple inclusion of class declarations ...

ClassA.h

```
ClassA
{
      *
      *
      *
};
```

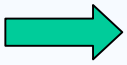
ClassB.h

```
#include “ClassA.h”
ClassB
{
      *
      *
      *
};
```

main.cpp

```
#include “ClassA.h”
#include “ClassB.h”
 int main()
{
      *
      *
      *
};
```

ClassA will be included twice



ERROR

ClassA.h

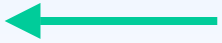
```
#ifndef __ClassA__
#define __ClassA__
 ClassA
 {
      *
      *
      *
 };
#endif
```

ClassB.h

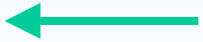
```
#include “ClassA.h”
#ifndef __ClassB__
#define __ClassB__
 ClassB
{
      *
      *
      *
 };
#endif
```

main.cpp

```
#include “ClassA.h”
#include “ClassB.h”
```



Includes, defines __ClassA__



__ClassA__ defined, so ClassA not included again

Portability ...

Handling compiler specific “features”

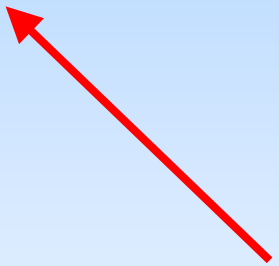
```
#ifdef _MSC_VER          // PC'c truncate the name of strstream.h
#include <strstrea.h>
#else
#include <strstream.h>
#endif
```

```
#ifdef _MSC_VER
        F.eatwhite();
 #endif
```

This routine is not part of standard IOstream class

Conditional compilation for debugging ...

```
#ifdef _DEBUG
    T&  operator()(long i1)
    {
    boundsCheck(i1, index1Begin, index1End,1);
    return *(dataPtr +  (i1 - index1Begin));
    };
#else
    inline T&  operator()(long i1)
    {
    return *(dataPtr + (i1 - index1Begin));
    };
#endif
```



Check index bounds if compiling with _DEBUG defined

Examples ...

Look at “other” code headers.

Look at system defined preprocessor directives ---
what happens when you switch between debug and release?