Compilation / Linkage Errors Immunization Booster Shot

Module #101

Coverage

Compilation Errors
Linkage Errors
Runtime Errors

Understanding runtime errors

Compile & Run this Code

```c
#include <stdio.h>

int main()
{
        int x;
        printf("Enter a value for x ");
        scanf ( "%d", x );
        if ( x = 0 )    printf("value is null\n");
        else            printf ("value is not");
                        printf ("null\n");
        printf("program is done\n");

}
```

Understanding Compile-time errors

[1] Playing with compilation time errors

- Let's make some obvious errors and check how the compiler is responding to them

- The point is to get used to receive error messages which are not directly related to the real error

- Learn to think how the compiler does

```c
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main ( )
{
   /* one line of output */
   printf ( "This is my first C program.\n" );
   return 0;
}
```

#1
Remove This

Not properly closed comments here are closing anyway aren't they ?
Does the compilation error message helps ? :)

```
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{
  printf ( "This is my first C program.\n" );
  return 0;
}
```

#3
Remove This

Not properly closed comments here are closing anyway aren't they ?
Does the compilation error message helps ? :)

```
/* File Name: Prog1_1.c
    Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{
   /* one line of output */
   printf ( "This is my first C program.\n" );
   return 0;
}
```

#3
Remove This
(another comment
is in the file)

USF

```
/* File Name: Prog1_1.c
    Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{
  /* one line of output */
  printf ( "my first C program.\n" );
  return 0;
}
```

#4
Remove This

```c
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{
   /* one line of output */
   printf ( "my first C program.\n" );
   printf ( " woohoo " );
   return 0;
}
```

#4
Remove This

```c
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include <stdio.h>

int main ( )
{
  /* one line of output */
  printf ( "my first C program.\n" ); printf ( "woohoo " );
  return 0;
}
```

#4
Remove This

```
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include <stdio.h>

int main ( )
{
   /* one line of output */
   printf ( "my first C program.\n" ); printf ( "); " );
   return 0;
}
```

#4
Remove This

```
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{

  /* one line of output */
  printf ( "my first C program.\n" ); printf ( "); " ); // ";
  return 0;
}
```

#4
Remove This

```c
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main ( )
{
  /* one line of output */
  printf ( "This is my first C program.\n" );
  printf ( "...second line here we go !!\n" );
  return 0 ;
}
```

#5
Remove This

Understanding link-time errors

USF

Playing with linkage time errors

- Once program compiles fine there can still be some errors you'll have to face…

- More about these quite at the end of this course but here is a primer...

```
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main ( )
{
   /* one line of output */
   printf ( "This is my first C program.\n" );
   return 0;
}
```

#1
Misspell this

```
/* File Name: Prog1_1.c
    Definition: A simple C program that displays a message.
*/
# include  <stdio.h>



int  main (  )
{
   /* one line of output */
   printf ( "This is my first C program.\n" );
   return 0  ;

}
```

#2
Remove This

```c
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>


int  main (  )
{

        /* one line of output */
        printf ( "This is my first C program.\n" );
        dowork();
        return 0  ;

}
```

ADD this

```
/* File Name: Prog1_1.c
   Definition: A simple C program that displays a message.
*/
# include  <stdio.h>

int  main (  )
{

        /* one line of output */
        printf ( "This is my first C program.\n" );
        dowork();
        return 0  ;

}
```

ADD this

What is the difference between

- linking against a library
- #including a header file

FAQ

- Why are both necessary ?

- Which one is relevant to compile time ?
- What does the compiler need exactly ?
  - –
- Which one is relevant to linkage time ?
- What does the linker need exactly ?

Linking, libraries and dynamically linked libraries

What's in an executable?

- Edit a *void.c* with only a main doing nothing at all
- compile it with gcc with dynamic shared libraries

    GCC -o void_dynamic void.c

- compile it with static linkage

    GCC -static -o void_static void.c

- Examine the sizes of the generated files …

What about overheads

```
-rw-r--r--      1 gaspara  voicedb       29         Aug 13 02:11  void.c
-rwxr-xr-x      1 gaspara  voicedb     13593        Aug 13 02:12  void_dynamic
-rwxr-xr-x      1 gaspara  voicedb    1673123       Aug 13 02:12  void_static
```

```
-rw-r--r--      1 gaspara  voicedb      339         Aug  9 16:35  hw.c
-rwxr-xr-x      1 gaspara  voicedb     13845        Aug 13 02:22  hw_dynamic
-rwxr-xr-x      1 gaspara  voicedb    1674168       Aug 13 02:28  hw_static
```