

## Game Tools and the command line

- many games have in game tools
  - you are working on one!
  - many level editors exist etc
- sometimes it is useful to develop game tools outside the game
  - provides mechanisms to batch process/script cpu intensive activities which can be run on server class machines
- there is benefit from understanding how such tools operate as this knowledge will be usefully transferable

## Command line tools

- often have similar options
  - most GNU utilities will implement
  - `-h`, `--version` options (for help and version)
- nearly all command line utilities also have on system man pages associated with them

## Examine the compilers on GNU/Linux

- the `gcc` compiler is an interesting example, and while `gcc` is a tool (C compiler).
  - the GCC project is the GNU Compiler Collection
  - which consists of the C compiler, C++ compiler, Java compiler, (and Modula-2 compiler)
- here we will look at some of the common options to `gcc`, `g++` and `gm2`
- notice how these three programs exist and GCC have tried to unify these command options
- these slides are simply a taster and huge simplification of how GCC might be used

## GCC debugging

- all front ends (in our case: `gcc`, `g++` and `gm2`) accept `-g -O0` which tell the compiler not to optimise and emit debugging information for `gdb`

## GCC uniformity of options

- they all understand `--version`

- ```
$ gcc --version
gcc (Debian 6.3.0-18+deb9u1) 6.3.0 20170516
Copyright (C) 2016 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.
No warranty is provided; see the source for copying conditions.
This is free software; see the source for copying conditions.
No warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

## GCC uniformity of options

- ```
$ g++ --version
g++ (Debian 6.3.0-18+deb9u1) 6.3.0 20170516
Copyright (C) 2016 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.
No warranty is provided; see the source for copying conditions.
This is free software; see the source for copying conditions.
No warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

- ```
$ gm2 --version
gm2 (GCC) 6.4.0
Copyright (C) 2017 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.
No warranty is provided; see the source for copying conditions.
This is free software; see the source for copying conditions.
No warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

## GCC uniformity of options

- simple compiles can be performed by:

- ```
$ gcc -o outputbinary -g sourcefile.c
```

- the `-g` option means generate debugging information so your program can be debugged via `gdb`

## GCC uniformity of options

- for complex projects can be compiled and linked via:

- ```
$ gcc -g -c sourcefile1.c
$ gcc -g -c sourcefile2.c
$ gcc -g -c sourcefile3.c
$ gcc -o outputbinary sourcefile1.o sourcefile2.o sourcefile3.o
```

## GCC uniformity of options

- there are many options in these tools, only a few of which are mentioned in these slides
- turn on all warnings by: `-Wall`
- so our command line to compile `hello.c` is:

```
$ gcc -g -O0 -Wall -c hello.c
```

## GCC uniformity of options

- notice that this compiles `hello.c` but does not link it
- to link this we can:

```
$ gcc -g hello.o
```

- the default output file is: `a.out` (which is used if you omit the `-o` option)

## GCC uniformity of options

- we could combine the last two steps by:
- ```
$ gcc -g -O0 -Wall hello.c
```
- many tools try and provide consistency between options
  - learn once use many times
  - many options have become a de facto standard
    - `--version`

- it is important to adhere to de facto standards when producing useful tools

## Coursework file format structure

- examine the file structure of the coursework zip file

```
$ ls
Level1 Level2 Level3
$ ls Level1
Enemy.bmp
fire.bmp
Floor.bmp
Goal.bmp
Level.txt
Player.bmp
Wall.bmp
```



**Level1.txt**

JewelThief/CLevel.cs

```

/// <summary>
/// This enum defines whether a level should be flipped
/// vertically or horizontally.
/// </summary>
public enum eFlipDirection
{
    Horizontal,
    Vertical
};

```

**Level1.txt**

JewelThief/CLevel.cs

```

/// This class is used to store all of the information
/// a level.
/// This includes the level layout stored in m_levelMap
/// start positions of the player and the enemies and t
/// goal.
class CLevel
{
    public int Height;
    public int Width;
    public int Time;
    public CPoint2i StartPosition { get; set; } = new CPoint2i(0, 0);
    public CPoint2i GoalPosition { get; set; } = new CPoint2i(0, 0);
    public List<CPoint2i> EnemyPositions { get; set; } = new List<CPoint2i>();
    public List<CPoint2i> FirePositions { get; set; } = new List<CPoint2i>();

    private eTileType[,] m_levelMap = null;
};

```

**Level1.txt**

- examine file JewelThief/CLevel.cs for the constructors and further details
- we can easily see that the txt file is loaded into these data structures
- text files are often used to configure applications (this is the norm for GNU/Linux and Unix utilities)