

## CS3S665 Game engine design: Profecta scaenam

- 100% coursework assessed
  - two pieces of coursework
- Coursework 1
  - enhancing Chisel and enhancing Python bots in Doom3
- Coursework 2
  - enhancing a Physics engine to implement a 2D game in Python
- both are available for view on <http://floppsie.comp.glam.ac.uk/Southwales/gaius/gameengine/html.html>

slide 3  
gaius

### Doom3

- we will be using the dhewm3 fork of the doom3 code with heavy modifications which include:
  - gore, speed ups
  - python bots!
- about 681075 total lines of code
  - however this includes many tools and libraries
- actual engine is closer to 137905 lines of code

slide 4  
gaius

### Game engines

- there are over 50 open source game engines
  - of differing size and quality
- require a balance between: complexity and resource requirements
- resource requirements are not always obvious
- for example the time to recompile Panda3D was 50 minutes on a 4 GHz AMD black
  - dhewm compiles in 3 minutes
  - pge compiles in 1 minute

## Doom3 advantages

- code base is very clean implemented in C++
- it does not use the STL
  - most libraries are implemented from scratch
  - highly portable codebase and fast
- Doom3 lineage is strong!
  - many eyeballs keep bugs shallow
- Doom3 codebase can be extended and makes an effective teaching tool
- all maps and models are stored in text format! (Excluding images/sounds)
- uses the MAP and BSP format which is the Rosetta stone to game engine design

## Morloc Tower

- **Morloc Tower** (<http://www.mobygames.com/game/dunjonquest-morlocs-tower>) was a game written in 1980
- the tower had six stories and consists of 30 rooms total
- the wizard Morloc was the boss enemy which you had to defeat to complete the game
  - the quicker you killed him the higher your score
- it had adventure elements to the game (pick up magic sword or hand grenade)
  - which would take time to find

## Morloc Tower

- there were smaller monsters to kill before you reached Morloc
  - single player real-time adventure game

## Penguin tower

- Penguin tower is a multiplayer 2 dimensional game which was inspired by Morloc Tower
- Penguin Tower is a very different game it does retain a similar screen layout and many of the key commands are the same
- the goal of the game is to stay alive as long as possible and to inflict the most damage on other players
  - genre is a graphical multiuser dungeon with a limited graphical interface and limited number of objects and weapons

## Penguin tower

- architecturally it consists of three main components, a client, a server and a protocol
- the client is written in Python and it utilises the pygame libraries
- the server is mostly written in Modula-2 and a small amount of C
  - the protocol is entirely character and string based

## Penguin tower

- the penguin tower server code was written during two Augusts in 1985 and 1986 and originally ran on a 6 Mhz PC clone connected by two Visual 200 terminals (making it a three player game).
- the maps were drawn with simple ASCII characters, and it was quite playable (for those days!)
- the 6 Mhz PC ran the server code quite comfortably, it occasionally slowed down, which perhaps added to its charm.
  - normally when someone pulled the hand grenade

## Penguin tower demo

- [demo screenshots](http://floppsie.comp.glam.ac.uk/Southwales/gaius/games/ptower.html) (`<http://floppsie.comp.glam.ac.uk/Southwales/gaius/games/ptower.html>`)

## Doom3 mod

- how difficult would it be to produce a Penguin Tower mod for Doom3?
  - utilise the monsters from Doom3
  - generate very simple maps in the style of (Morloc Tower and Penguin Tower)
- very simple maps have the advantage of only having 90° corners
  - ideal teaching vehicle and also it should be possible to generate maps quickly

## Penguin tower maps

- there are a number of penguin tower maps and a tool to randomly create large maps
- the Penguin tower file format is simple and easily extensible

## Penguin tower map: star.pen

```
ROOM 1
WALL 1 1 1 20
WALL 1 20 20 20
WALL 20 20 20 1
WALL 20 1 1 1
DOOR 9 20 12 20 STATUS CLOSED LEADS TO 5
DOOR 20 9 20 12 STATUS CLOSED LEADS TO 5
END
```

- etc

## Chisel

- [Chisel](https://github.com/gaiusm/chisel) (https://github.com/gaiusm/chisel)
- is a github project containing command line tools to create doom3 maps
- the tools allow anyone with basic computer skills to generate small doom3 maps

## Map: one.txt

```
define l room 1
define s worldspawn
define o monster monster_demon_imp
define n monster monster_demon_hellknight
define i light
define a ammo ammo_shells_large 16

#####
# 1   i       i               i
#
# s       a               o               n
#
#               i               i
#####
```

## Map: two.txt

```

define 1 room 1
define 2 room 2
define s worldspawn
define o monster monster_demon_imp
define n monster monster_demon_hellknight
define i light
define a ammo ammo_grenade 16

#####
# 1          i      # 2          i      #
#           o      #                #
# s          .      #                #
#           .      #                #
#           #      # g      n      #
#         i      # i      #
#####

```

## Compiling a map

```

$ txt2pen -o one.pen one.txt
$ pen2map -o one.map one.pen

```

- notice the txt file is compiled into a pen file
  - the pen file is compiled into map file

## Conclusion

- continue next week!