

John Romero Programming Proverbs

- 2. “It’s incredibly important that your game can always be run by your team. Bulletproof your engine by providing defaults (for input data) upon load failure.”
- John Romero, “The Early Days of Id Software - John Romero @ WeAreDevelopers Conference 2017”

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>

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

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)

Doom3 advantages

- 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>`
- 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

#####
# l      i      i      i      #
#                               #
# s      a      n      #
#               o      #
#           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!