

# TAGE COMBAT:

Final Stand

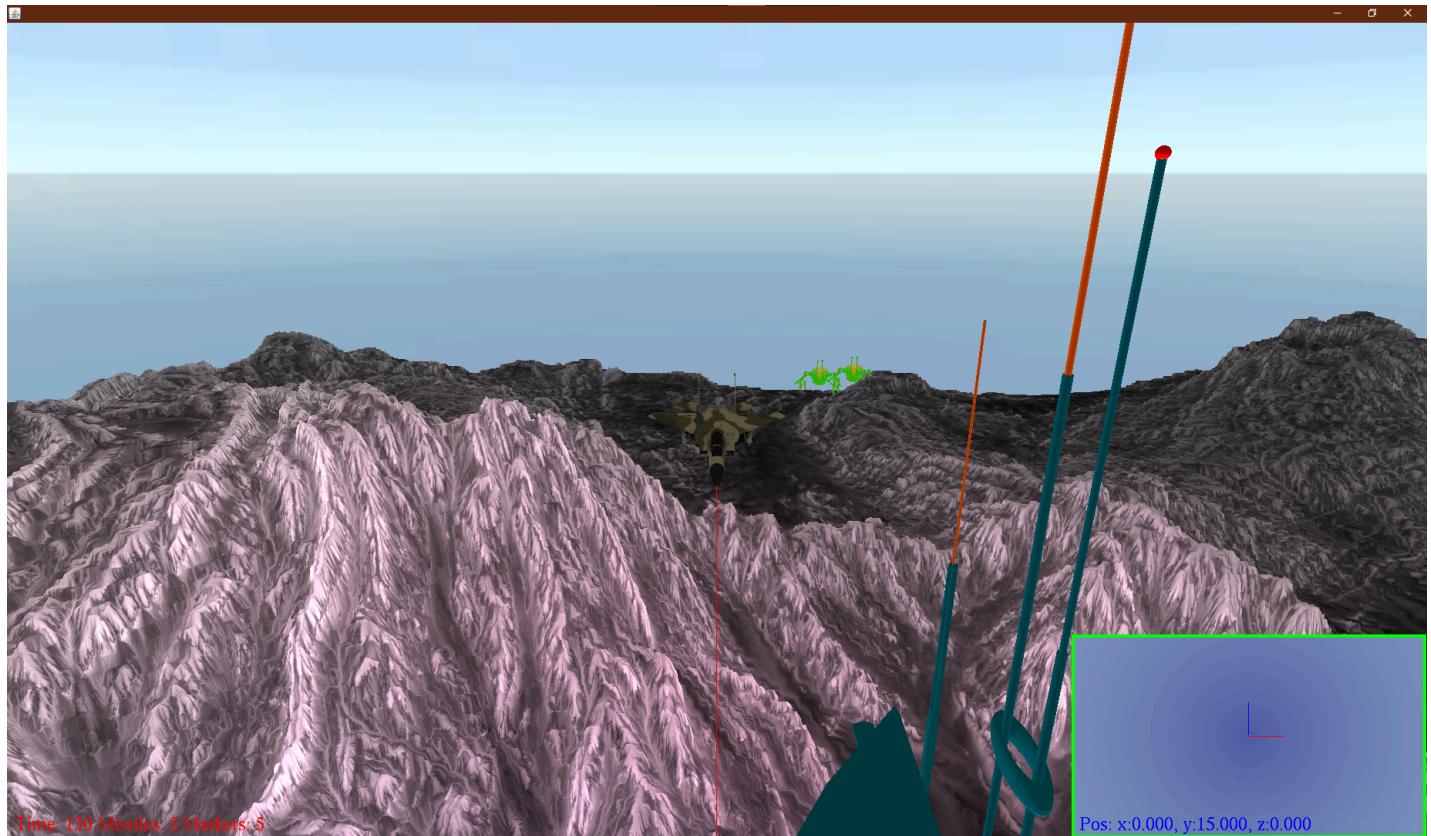
Player Guide

Gabriele Nicula & Keegan Rhoads

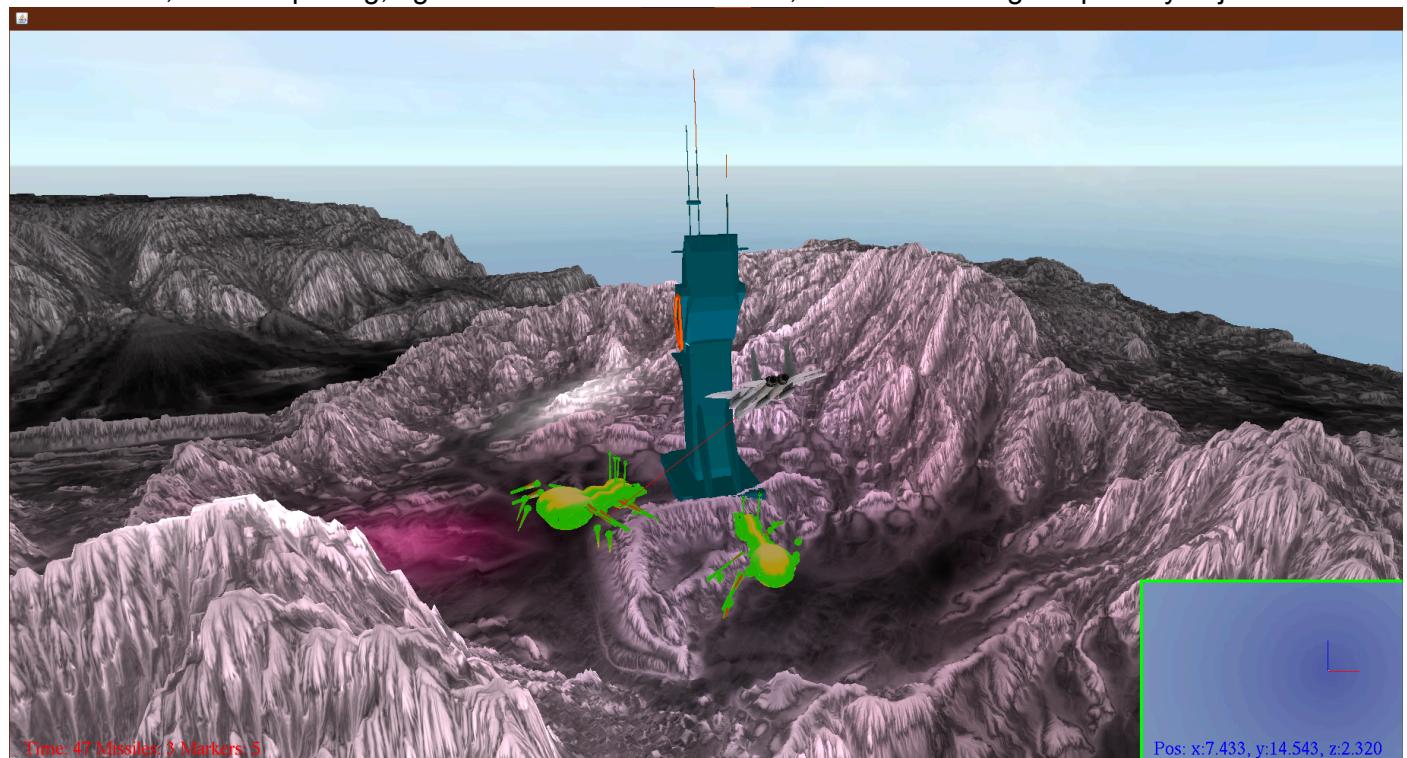
CSC165-01 — CSC165-02

Dr. Scott Gordon

## 2. Screenshots of Gameplay



Above, Game Opening, right after avatar select. Below, avatar defending the primary objective.



### 3. Instructions to Run Game and Server

- Navigate to the home directory.
- For a singleplayer game
  - Run ./compile.bat.
  - Run ./run.bat.
- For a multiplayer game,
  - Run ./compileServer.bat
  - The ./runServer.bat must be configured with the desired port and protocol. For this game, **only UDP is supported** and the port can be any available port.
  - In the ./run.bat file, the IP address must be set to the IP address of the host machine and the port should be set to the same as the server (IP address can be found in command prompt using “ipconfig”).
  - The server should be launched first, and then clients may join by running the modified ./run.bat file after compiling.

### 4. Required Controllers/Devices

- A controller is required for the game to launch, but is not necessary to play the game.

### 5. Gameplay

The player must stop the invading bugs from attacking the Base Tower. If the bugs get too close for too long, the game is over! Use the machine gun, missiles, and orbital lasers to destroy the bugs. The bugs are agile and single-minded: they will climb over steep terrain and ignore the player's presence on their way to attack the tower.

### 6. Controls

Keyboard Controls:

- Cycle Through Avatar Selection: Z
- Select Current Avatar: X
- Forward / Backward: W / S
- Yaw Left / Right: A / D
- Roll Left / Right: Q / E
- Pitch Up / Down: Down Arrow / Up Arrow
- Rotate Camera Left / Right: Left Arrow / Right Arrow
- Camera Elevation Up / Down: R / F
- Fire Main Gun: C
- Fire Missile: Spacebar
- Drop Marker: V
- Pan Minimap Up / Right / Down / Left: O / P / L / I
- Zoom MiniMap In / Out : ] / [
- Exit: Esc

- Debugging controls:
  - Turn On/Off Jet Wireframe: 2 / 3
  - Turn Off/On Tower Light: 6 / 7
  - Physics start (On by Default): 5

#### Gamepad Controls:

- Forward / Backward : Gamepad Right Trigger / Gamepad Left Trigger
- Yaw Left / Right: Gamepad Button 5 Left Bumper, Gamepad Button 6 Right Bumper
- Roll Left / Right: Gamepad Left Joystick X-axis Left / Gamepad Left Joystick X-axis Right
- Pitch Up / Down: Gamepad Left Joystick Y-axis Up / Gamepad Left Joystick Y-axis Down
- Rotate Camera Left / Right: Gamepad Right Joystick X-axis Left / Gamepad Right Joystick X-axis Right
- Pitch Camera Up / Down: Gamepad Right Joystick Y-axis Up / Gamepad Right Joystick Y-axis Down
- Camera Zoom In / Out: Gamepad Button 3 / Gamepad Button 4
- Fire Main Gun: Gamepad Button 2
- Fire Missile: Gamepad Button 1
- Drop Marker: Gamepad Button 8

## 7. Modifications to the Network Protocol

- Added TextureID to create avatar message
- Added Create/Move/Rotate Marker Message
- Added Create/Move/Rotate Missile Message
- Added Create/Move/Rotate Bullet Message
  - All the additional messages were also handled on the server side.

## 8. Changes and Additions to the TAGE Engine

- Orbiting/Chase Camera
- Added methods in GameObject for:
  - Pitch
  - Yaw
  - Roll
  - MoveForwardBack

## 9. Gameplay Elements

- Genre: Action
  - The goal is to fight off a swarm of bugs while flying fighter planes.
- Themes: Future, Alien World
  - Advanced technology in the form of giant lasers, fighting bugs on their own planet.
- Dimensionality: 3D

- Fly around over complex terrain.
- Activities: Air-Ground Combat versus moving targets, Flying
  - Fly around and shoot bugs that are crawling along the terrain.

## 10. How Requirements are Satisfied

- External Models (Created Using Blender)
  - Base Tower: Custom Blender Model by Gabriele Nicula
  - Marker (looks like a bomb): Custom Blender Model By Gabriele Nicula
  - Bug Enemy: Custom Animated Blender Model by Keegan Rhoads
- Networked Multiplayer
  - Clients can see other planes and their rotations.
  - Clients can see other planes' bullets, missiles, and markers.
  - Single-player is also accessible by launching the game while no server is open or when an invalid IP address is configured.
  - When the game opens (client connecting), there is an option between two avatar models, a gray fighter plane and one with green camouflage. This is implemented as a startup screen until the user selects one of the available planes with 'X'.
  - The texture selected in the startup screen is passed through the network as part of the CREATE message to the other clients.
- Skybox and Terrain
  - Skybox and terrain can be seen as soon as the game opens, as the game takes place entirely outside.
  - Terrain is heightmapped and if the avatar plane hits the terrain they "crash" and are reset to the starting position.
- Lights
  - One Global Ambient Light at close to Origin
  - Two Positional Lights arranged symmetrically
  - One Positional Light that is placed on a spherical beacon Object on one of the antennas of the Base Tower, with specular and diffuse lighting effects and linear attenuation. This light can be toggled on/off with keys 6,7 on keyboard. It has a reddish hue.
- HUD
  - Lower left corner HUD has the selection screen options when selecting an avatar
  - Lower left corner HUD houses ammunition counts and time elapsed when playing
  - Lower left corner HUD displays Win / Lose condition
  - Lower right corner secondary HUD tells the player their current location in the world and displays an overhead map view. This secondary HUD also has zoom and pan capabilities.
- 3D Sound
  - Action sounds play when
    - Firing the gun
    - Firing missiles

- Bugs are alive
  - Two engine sounds which dynamically change when the forward throttle is used
- Background sound plays as soon as the game starts and loops the background music. There are two different background tracks, each of them applies to an avatar selection.
- The GhostAvatar has its own engine sound which moves with the GhostAvatar, it is positional and 3D.
- Hierarchical SceneGraph
  - The small spherical red light beacon on top of the tower antenna is a child of the Base Tower. This helped to place the Light on top of the Base Tower's antenna.
  - Targeting laser is a child of the player character to help them visualize where their attacks are going
- Animation
  - Enemy Bugs have a walk cycle (does not appear entirely correct, but it is close) with 4 legs that are individually moving.
- NPCs
  - There are multiple enemy bugs (NPCs) which are programmed to walk on the terrain respecting the heightmap towards the Base Tower. They are moving independently and are spawned in random but constrained areas to make the game challenging.
- Physics
  - The marker drop uses physics to fall and then bounce around after being deployed by the avatar.
  - The marker collision with the terrain is done through JBullet's ability to detect which objects have collided, similar to the distributed example.

## 11. Unfinished/Non-functional Requirements

- Animations on the Bug Enemy are weird and do not match up with what shows up in Blender (bones not connected and oriented in strange ways)
- NPC Controller not implemented, simple behavior in update() cycle only. Due to the objective of the game, this doesn't impact gameplay because the enemies are trying to attack the base, so their movement can be programmatically defined.

## 12. Above and Beyond the Requirements

- 9 OBJ imported models:
  - **Base Tower**
  - **Enemy Bug**
  - **Marker**
  - **Bullet**
  - **Aiming Laser**
  - **Orbital Laser**

- F15
- Missile

The **bold** ones are made by us using Blender.

- Ghosts for Bullet, Missile, and Marker objects deployed by ghost avatars.
- Collision detection with the heightmap of the terrain.
- 3D positional sound for the GhostAvatar.
- Different Background Music for different Avatar textures.

## 13. Contributions from Each Group Member

- Gabriele Nicula
  - Game Idea and implementation plans
  - Blender models for:
    - Base Tower
    - Marker
    - Orbital Laser
    - Bullet
  - Network messages and Network Communications
  - Toggleable lights
  - Positional Sounds for avatars and enemy bugs
  - Input Action handling
  - Marker physics
  - GameObjects handling
- Keegan Rhoads
  - “Bugarino” bug enemy (Animated, has UV unwrapping)
  - Documentation
  - Javadocs
  - Jet movement
  - NPC movement & NPC testing
  - General testing
  - Graphics improvements
  - Targeting laser
  - Added camera actions and keyboard bindings

## 14. Assets from CSc 165/155 and Personal Models

- Personal
  - Base Tower
  - Bugarino Bug Enemy

## 15. Assets from the Web + Sources

- All of the following sounds/models are used unmodified
- Bug Chitter Sound
  - <https://pixabay.com/sound-effects/critters-creeping-32760/>
  - <https://pixabay.com/service/license-summary/>
- Select Avatar Sound
  - <https://opengameart.org/content/toom-click>
  - <https://creativecommons.org/licenses/by/4.0/>
- Main Gun Sound
  - [https://www.youtube.com/watch?v=SN4jfxckQiM&ab\\_channel=Century](https://www.youtube.com/watch?v=SN4jfxckQiM&ab_channel=Century)
- Jet Idle Sound
  - [https://www.youtube.com/watch?v=jQIwmKEZby4&ab\\_channel=KOSKEIAEROSPACE](https://www.youtube.com/watch?v=jQIwmKEZby4&ab_channel=KOSKEIAEROSPACE)
- Jet Afterburner Sound
  - [https://www.youtube.com/watch?v=TBi3sUvmOd4&ab\\_channel=USAMilitaryChannel](https://www.youtube.com/watch?v=TBi3sUvmOd4&ab_channel=USAMilitaryChannel)
  - For all Youtube sources
    - Fair Use/ Creative Commons
      - <https://creativecommons.org/licenses/by/4.0/>
      - [Fair use on YouTube](#)
- Missile Sound
  - <https://soundbible.com/1794-Missle-Launch.html>
  - Public Domain
- BG Music 1
  - <https://pixabay.com/music/metal-melodic-metal-186403/>
  - <https://creativecommons.org/licenses/by/4.0/>
- BG Music 2
  - <https://pixabay.com/music/rock-crag-hard-rock-14401/>
  - <https://creativecommons.org/licenses/by/4.0/>
- Jet Models + Textures
  - [F 15 C Eagle free VR / AR / low-poly 3D model | CGTrader](#)
  - [General Terms and Conditions | CGTrader](#) Royalty Free no AI
- Terrain Map
  - [Alien planet terrain - 8k 3D model free 3D model | CGTrader](#)
  - [General Terms and Conditions | CGTrader](#) Royalty Free no AI
- Skybox
  - [Sky Box - Sunny Day | OpenGameArt.org](#)
  - [CC BY 3.0 Deed | Attribution 3.0 Unported | Creative Commons](#)
- Missile Model + Texture
  - [Missile Ready Max Free \(turbosquid.com\)](#)
  - <https://blog.turbosquid.com/turbosquid-3d-model-license/>

## 16. Tested RVR-5029 Machines

ECS - WARCRAFT

ECS - QUAKE