Final Report

Suppose you are the lead Game AI designer in your small, independent computer game company, employing only a dozen or so people. Electronic Arts has decided to put out a bid for proposals to develop a new game, tentatively titled *Y'all'ses Sky* that will compete with *No Man's Sky*. Like *No Man's Sky* the game will be about space exploration with a nearly unlimited number of stars, each of which may have between 1-5 planets. Each planet will have its own, unique geography, flora, and fauna. Unlike No Man's Sky, *Y'all'ses Sky* will be a cyber-western in which the player is a space cowboy (or cowgirl) with an interstellar spaceship and makes a living as a freelance-for-hire. Non-player characters (NPCs) will post contract jobs that the player can take.

Your job is to prepare a proposal for how you would build all of the AI components of the game. Keep in mind that you only have about a dozen employees at your independent game company.

The game is to be designed for modern desktop computers (i.e., 3 GHz processor, at least 16 GB of RAM, 1 TB of storage (although you should not use it all), and a graphics card with at least one GPU) with a fast, wired Ethernet connection to the Internet.

In the game's universe, there are many alien civilizations, each of which has its own unique appearance, language, city architecture on planets, and space ship designs. Some aliens will be friendly and some will be hostile. When humans discovered faster than light space travel, they also discovered that both humans and all alien races evolved (were seeded) from an ancient, powerful, and now-extinct alien race called the *Precursors*.

Types of contract jobs the player can take will include:
- Search for suitable planets for human colonization, given a set of specifications about the planetary system, flora, and fauna.
- Escort colony ships to destination planets, defending the colony ship against hostile aliens.
- Clearing planetary system of hostile aliens using force.
- Defending existing colonies against hostile aliens.
- Search planets for exotic Precursor artifacts.

When not taking contract jobs, the player will be free to roam around the universe, discovering, collecting and selling resources, and trading information about alien races. When a player meets other players, they can attempt to "steal" each other's contracts by completing the job in the place of the other player. Players can also choose to team up to complete contracts.

As the player gains resources from successfully completing contracts, they will be able to upgrade their spaceship, enabling him or her to take bigger contracts.

The universe will **not** be pre-populated with planets and alien races. Every time a player visits a new star, the entire planetary system will be generated on the player's computer and then uploaded to Electronic Arts servers so that future players can visit the star system and see the exact same planets.

Your report should minimally make recommendations on how to achieve the following tasks with artificial intelligence algorithms. For each task that artificial intelligence can help with, provide at least two alternative techniques and then explain why one is preferred.

- **Planet terrain generation.** Planets should have distinctive continents and oceans. When humans colonize planets or when planets have alien civilizations, they will have cities. Alien civilizations should have distinct architectural and city planning styles. Human cities should look similar to each other.
- **Flora generation.** Each planet should have plants and trees that look different from those of other planets.
- **Fauna generation.** Each planet should have wild animals that look different from those of other planets.
- **Alien spaceship designs.** Different alien civilizations should have distinctive styles.
- **Alien appearances and languages.** Aliens should look different from each other and speak different alien languages (all alien language will appear in a strange looking script, but will be translated into English by a "universal translator").
- **Fauna and alien pathfinding when on planets.** On planets, aliens and animals must move around without colliding into things.
- **Alien tactical combat decision making when on planets and in space.** Alien species should favor different tactics.
- **Fauna behavioral decision-making.** Animals that populate planets should behave differently from each other.
- **Mission (contract job) generation.** See above for examples of types of missions. Should missions build off each other, be completely independent, or a combination of both?

If there are not enough details in the description of the game above to make a conclusive recommendation, either state what assumptions you would have to make for your recommendation to hold.

As a rough rubric, you should expect to spend at least 1/2 page per topic above. Plan for about 450 words per page, using Times New Roman 12 point font. Figures, images, and diagrams are encouraged.

You may research news articles and other resources on the Internet on No Man's Sky, artificial intelligence, and procedural content generation in the preparation of your report. Cite any references you use to prepare your report.