

Team 6

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Graphics Research Proposal

Our project application will explore particle systems in WebGPU. Such particle systems may include fire, smoke, explosions, sparklers, rain, snow, etc. Once the functionality of these systems has been implemented, we will implement a cinematic scene on a landscape with infinitely spawning particles, visual flair, and several interaction-based particle effects. The landscape will be based on an immersive environmental area, such as a grassy area with trees or a mountainous region with snow.

One potential setup is to have a snowscape containing a TNT object with a rope that lights on fire when the player interacts with it. The rope will burn away, and when the fire reaches the TNT, the fire will disappear, destroy the TNT, and create an explosion, with particle effects, that blasts the objects around it at high velocities. Sound effects may also be implemented. The exact landscape and layout we will use is still tentative.

We will experiment with multiple methods for producing particles, such as animated textures, modifying the primitives object to change vertice point size, etc. If relevant, we may investigate multiple methods for creating particle textures. One example is animated textures, which can be done with multiple texture bind groups or use of the copy texture function. These are both methods we have not covered in class. Primitive points could be generated by implementing an additional pipeline just for primitive points. We will consider the performance impact each method has on the pipeline during development.

Our project should balance visual flair with performance, code readability, and scalability. To test the application, we will start the file, observe the particle effects, and interact with the objects that involve additional particle effects. Throughout development, we may also measure performance and test the application with high numbers of particles to determine how best to optimize the program.