**7-1 Final Project: Design Decisions**

**Joseph Wilfong**

**SNHU**

**CS-330**

**Professor Phillips**

**10/19/25**

**Design Decisions**

**Development Choices**

I evaluated multiple ways to model each object, then chose the approach that best balanced realism, control, and the constraint of the starter meshes.

* **Meat:** I tried smooth shapes first (tapered cylinders and spheres). They read as organic but not cut by a knife. I then compared three faceted approaches: stacked boxes, clipped corners using pyramids, and a hybrid. Boxes gave crisp straight planes, but silhouettes looked blocky. Pyramids used as primary forms produced readable knife-like facets with fewer parts. The final mound uses several 4-sided pyramids of different scales and rotations; plus, a meat texture I got online.
* **Knife tip:** Options were a box only, a short cone or tapered cylinder add-on, and a dedicated triangular primitive. I chose a small pyramid wedge, aligned to the box blade, which created a sharp, controllable point without adding a new mesh type at runtime.
* **Cup and marinade:** I compared textured opaque plastic vs true see through. Opaque was simpler but hid interior detail. I implemented a clear plastic material with alpha, enabled blending, and drew transparent parts last. The inner cylinder is opaque for the liquid, and the outer cylinder is the cup wall. This preserved the look of a plastic quart container while showing the marinade line and floating chunks.
* **Tweezers****:** I prototyped curved pieces and multi part assemblies. They felt noisy. I settled on two thin, parallel metal strips that touch at the base and separate slightly at the tips. This matched the reference and kept the build simple and readable.

These choices were guided by how the forms read under light, and how quickly I could iterate using only transforms, materials, and the existing draw calls.

**Navigation**

Navigation follows the input pattern from the course base. The user can translate the camera with the keyboard, orbit and look around with the mouse, and adjust zoom with the scroll wheel. Specifically:

* **Move:** W, A, S, D for forward, left, back, right. Q and E for down and up.
* **Look:** Moves with the movement of your mouse.
* **Speed:** The mouse wheel adjusts the speed at which you can move around the scene.

I kept object scales close to real world proportions, so camera motion feels natural at default speeds. The countertop is centered at the world's origin, which makes reset and reframe predictable. The draw order is stable, so rotating around transparent plastic does not produce popping. These choices let a viewer inspect materials, highlights on metal, and the cut planes on the meat without getting lost.

**Custom Functions**

I leaned on the project’s managers to keep things modular: SceneManager for transforms, materials, and per object state, and ShapeMeshes for geometry. Within that structure I added lightweight extensions that improve organization without changing the framework:

* **Material presets by tag:** I defined a clear plastic material tag plasticClear with high specular and shininess. This lets me switch any object to that look by changing only SetShaderMaterial("plasticClear"), no shader edits required.
* **Alpha by object via SetShaderColor:** For see through parts I set an RGBA color with alpha less than 1, which automatically disables texture use for that draw and keeps transparency control local to the object block.
* **Consistent transform pattern:** Every draw uses the same sequence, scale then X, Y, Z rotation, then translation. This acts like a mini convention that keeps blocks readable and reduces mistakes when I tweak numbers.

These choices make the scene easy to extend. For example, a glass jar or acrylic lid can reuse plasticClear and the same transparency pattern. A different meat cut can be composed by reordering a few pyramid blocks without touching any shader code.