Particle Systems

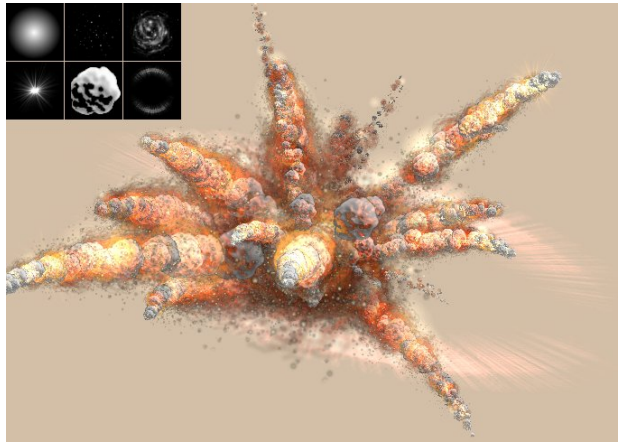
“A particle system is a collection of many many minute particles that together represent a fuzzy object. Over a period of time, particles are generated into a system, move and change from within the system, and die from the system.”

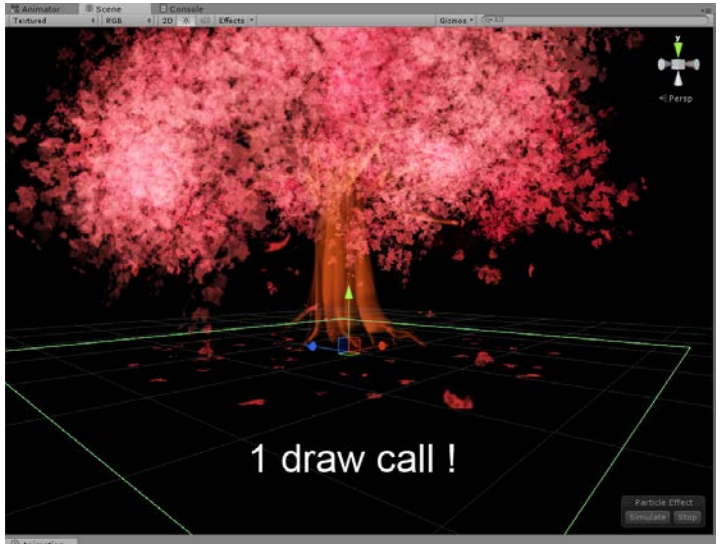
> *—William Reeves, "Particle Systems—A Technique for Modeling a Class of Fuzzy Objects,"* ACM Transactions on Graphics *2:2 (April 1983), 92.*

From The Nature of Code

Particle Systems

- Large number of (usually) small sprites/meshes that are used to create “fuzzy” phenomena – fire, smoke, grass, leaves, hair, moving water, space, explosions, etc.
- Particle System References: Overview, Manual

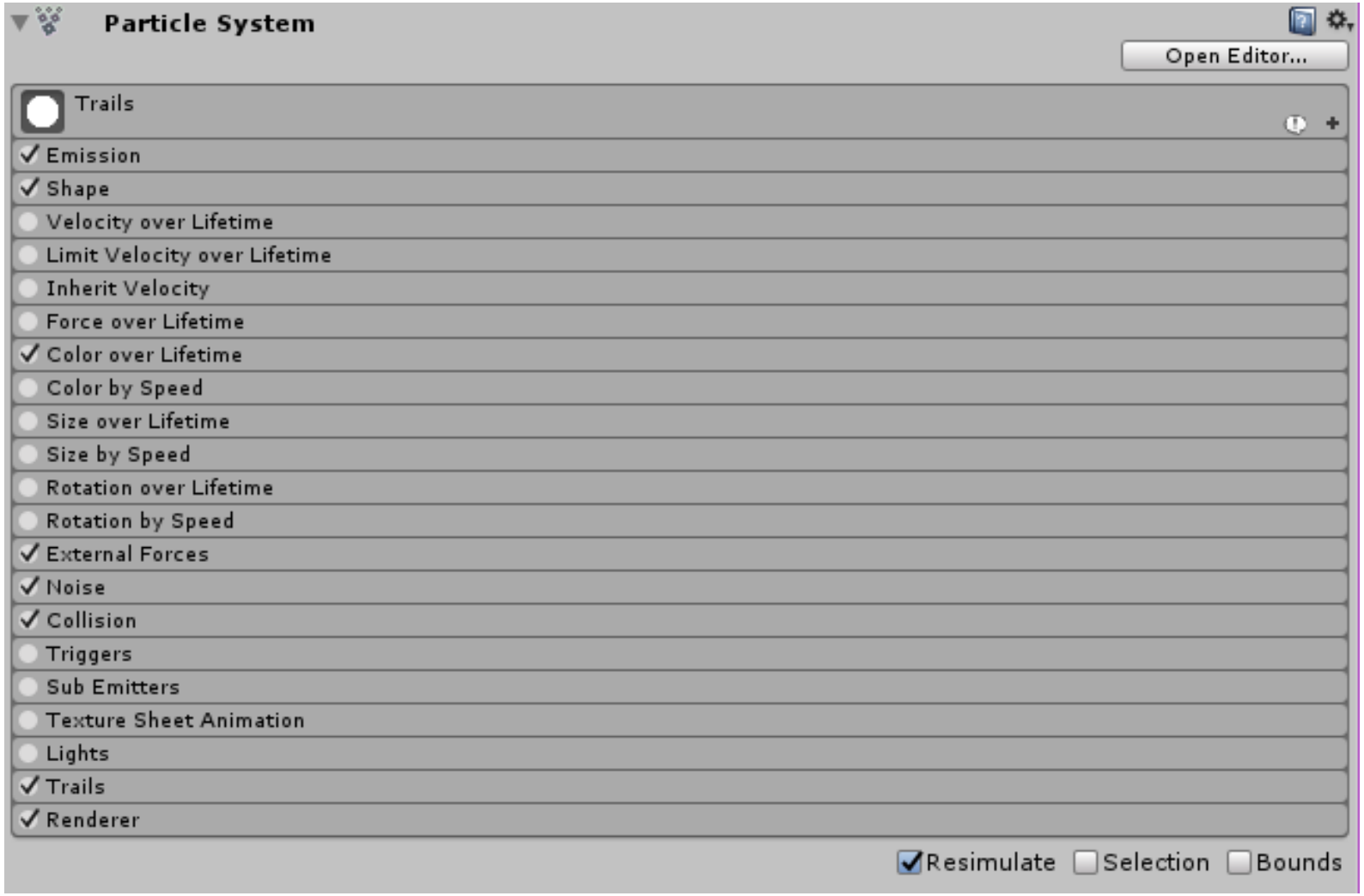




- Introduces:
  - Particle trails
  - Particles as light sources
  - Noise module
  - Gradient color controls
- Reference

Unity's Particle System

- Component-based system
- Refer to the manual for individual settings



Varying properties over time

Many of the numeric properties of particles or even the whole Particle System can vary over time. Unity provides several different methods of specifying how this variation happens:

- **Constant:** The property's value is fixed throughout its lifetime.
- **Curve:** The value is specified by a curve/graph.
- **Random Between Two Constants:** Two constant values define the upper and lower bounds for the value; the actual value varies randomly over time between those bounds.
- **Random Between Two Curves:** Two curves define the upper and lower bounds of the the value at a given point in its lifetime; the current value varies randomly between those bounds.

Similarly, the **Start Color** property in the main module has the following options:

- **Color:** The particle start color is fixed throughout the system's lifetime.
- **Gradient:** Particles are emitted with a start color specified by a gradient, with the gradient representing the lifetime of the Particle System.
- **Random Between Two Colors:** The starting particle color is chosen as a random linear interpolation between the two given colors.
- **Random Between Two Gradients:** Two colors are picked from the given Gradients at the point corresponding to the current age of the system; the starting particle color is chosen as a random linear interpolation between these colors.

For other color properties, such as **Color over Lifetime**, there are two separate options:

- **Gradient:** The color value is taken from a gradient which represents the lifetime of the Particle System.
- **Random Between Two Gradients:** Two colors are picked from the given gradients at the point corresponding to the current age of the Particle System; the color value is chosen as a random linear interpolation between these colors.