

# Advanced Game Engineering

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## Abstract

A video game is an electronic game that involves human interaction with a user interface to generate visual feedback on a video device such as a TV screen or computer monitor. The word video in video game traditionally referred to a raster display device, but in the 2000s, it implies any type of display device that can produce two- or three-dimensional images. Video games are sometimes believed to be a form of art, but this designation is controversial.

## 1 Introduction

What is a game engine? The things that games are built on

Games have a ton of functionality in common  
Even beyond superficial things typically defined by genre or gameplay

Why re-write those same sets of functionality every time we want to make a new game?

Generalizable system providing a set of useful, flexible components

Generalizable - Could other games use this functionality?

Useful - Would other games benefit from using this functionality?

Flexible Can a game tweak how the system behaves to get a desired effect?

Implemented as a framework or a library

Frameworks dictate control flow

Libraries do not dictate control flow

Your engine will use both design patterns

Systems an engine might support:

Rendering

Input

Physics

Sound

Networking

AI

And much, much more

Each of these serves a dramatically different purpose depending on the game using it

Can we make an engine that supports every kind of game?

## 2 Real-time strategy (RTS) engine

Large number of low-detail game units

Multiple levels of AI (unit, squad, team)

Client/server networking with some lag tolerance

Heightmap-based terrain

## 3 Vehicle simulation engines

Low number of high-detail models, with level-of-detail management

Limited AI components

Minimal network latency

Realistic environment and physical forces

## 4 Graphics: Renders

DirectX

OpenGL

HTML canvas/WebGL

Platform specific rendering

Everything is triangles

and Textures

and Lightning

and Shaders