Ref: <https://www.studytonight.com/3d-game-engineering-with-unity/introduction>

What is a Game?

Well, you all have heard about the term **Game**. A Game can be defined as an activity enrolled for amusement as a prepared form of play that basically undertakes for enjoyment and/or as an educational tool.

## What is a Video Game?

A video game can be defined as a game that runs on electronic devices which involves humans interacting with a user interface(UI) for generating visual responses on any video device like TV screen or computer monitor. This electronic game when played by a user, deals with a set of graphics, images or even audio to make the game more interactive.

In simple words, video games are the digital entertainment platform (which is a form of software) that humans "play" via a computer, TV, smart phones, tablets or other gaming consoles.

### **Game Development**

Game development is the procedure of creating video games which involves working on some platform/software to develop the game. The development is undertaken by a game developer which can be one person or a team of **Game Engineers** (for constructing the overall structure and game play), **Designers** (for designing the objects and animations), **Coders** (for coding and giving life to the game including logics, score and other calculations), **Project Manager** (for managing and promoting the game), **Game Tester** (who will test the game after it has been developed to find bugs in the game, if any). All of these human resources come under Game developers and the process of developing the complete game is termed as **Game Engineering**.

### **Game Development Tools**

Game development tools are specialized software solutions which allow and facilitate the development of a video game easier. In developing a game, the team of developers may need animation software to design a player, or trees, or any other object being used in the game; or a coder may need **Visual Studio** or **MonoDevelop** editor to inject specific code to move a game object, all these tools come under Game development tools. In other words we can say that the tools required to develop the complete game comes under the tag-line of game development tools. All these tools helps in engineering a game.

# **Game Development Concepts**

Game development is one of the most exciting fields of computer science and a major part of the software development industry. Computer games comprise of a large and ever expanding market world-wide.

Interactive digital media and games along with entertainment applications have an enormous craze amongst the daily users of PCs and play an important role in providing economical strength(as games are not free), a factor which cannot be easily neglected.

So game development will also continue giving birth to new ideas and interactive devices for making the game play more attractive and exciting. For this game developers need to be well trained and equipped with their development skills.

### **Game Development is Software Development**

The steps and stages required for a game's development follow similar stages like that of software development, along with a few extra stages for successful completion of the game. Since game development is a major part of the software development industry, therefore game development also goes through the various phases of **SDLC (Software Development Life Cycle)** along with some extra phases. Let's explain these phases in details.

Software Development Life Cycle is a well-structured and arranged sequence of phases in software engineering for developing the intended software product. Same structure needs to be followed by a game developer also. These stages are:

1. **Communication:**

Here, the user initiates the request to develop a desired game. Then he/she contacts the developer or project managing firm and tries to discuss the terms. Then after a successful agreement, stage 2 will begin. If the user himself is a hame developer, then it starts from stage 2 directly.

1. **Requirement Gathering:**

In this stage, the game development team discusses the requirements to carry on the project and the project manager will decide the number of human resources required for the project. The team will carry out the discussion with varied stakeholders to discuss problems with various domains with a motive to bring out as much information as possible based on their requirements.

1. **System Analysis:**

In this stage, the developers will decide the roadmap of the plan for a successful game development till release and try to come up with the best software model (we will discuss about software engineering models in next chapter, in details) appropriate for the project. This phase also includes a proper understanding of the product's limitations or changes required in existing systems beforehand.

1. **Systems Design:**

In this phase of development, desired features and detailed work, which includes game-play, setting up of objectives and levels, screen layouts, player and game object model; creating animations in game, business rules, process diagrams (UML, DFD), pseudo-code and other documentations (GDDs) are done.

1. **Development Phase:**

The real code for your game will be written in this phase. This can be from a pseudo code or a set of algorithms written in the GDD (Game Design Document).

1. **Integration and Testing Phase:**

In this phase, a demo version of the game is released, with a trial period of 15 days or 1 month. This is done officially by the team itself to check for errors and popularity. With this partial release of game, the promotion is also started on websites like YouTube and other gaming sites. At the same time tester(s) are hired to check for bugs in the game.

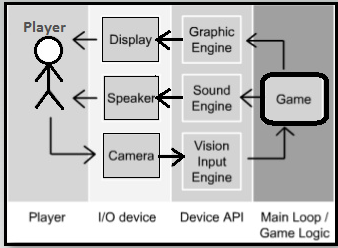
So all these stages must be followed to make a game and to make it successful.

### **Agile Model**

In this model, the product is broken down into a set of features, and hence it is used for quickly delivering a working product and so considered as a very rational development method. This model generates ongoing releases of your project, each having small and incremental changes updated from the previous released version. At each cycle, the project is tested and then released.

## Architecture of a Game

The architecture and structure of a game is similar to that of a software. But it does have some additional components which makes it different from a software. Every game has the following components:



* Graphics Engine
* Sound/Audio Engine
* Rendering & Vision-Input Engine
* I/O Devices (like, Mouse, keyboard, speaker, monitor etc)
* DLL files and Drivers/Device APIs

# **Game Engines**

For every game, game engine plays a major role since the game engine helps the game designers to bring characters of the game to life, by helping in scenes, characters and graphic generation, sound, artificial intelligence, scripting animation, networking etc. Game Engine is like an integrated development environment, with a readymade suite of visual development tools and reusable software components. It turns the complex task of game development simple, by providing an abstraction layer, which makes a lot of big tasks look very easy, while the game engine does all the hardwork in the background. In other words, it is a framework that is designed specifically for the construction and development of video games. Developers use these game engines for creating games for consoles, mobile devices and personal computers.

A Game Engine is created to develop games, just like any other IDE for any particular language programming. All the components in the game engine are built and integrated to support the motive of game development.

# **Different Genres of Game**

Genre of a game defines the exact category of the game and can be relayed through the similar gameplay characteristics, like - the type of objectives and storyline, the levels and camera point (i.e. FPS, TPS), the features and the storyline that the game is showcasing. Genre of a game is not defined by the content or the playing mode, but by the common challenges and characteristicss, that the game is having. For example, **FIFA** and **PES - Pro Evolution Soccer** have similar properties and objectives as both of them are soccer games and the player's get points or the levels of difficulty raises as the team wins the matches by scoring goals, like a real life football match. Genre of a game is decided by the resemblance found and listed under a common heading, here, FIFA and PES will come under *Sports-Genre Game*.

Ref: <https://en.wikipedia.org/wiki/Puzzle_video_game>

Puzzle games focus on logical and conceptual challenges. While many [action games](https://en.wikipedia.org/wiki/Action_game) and [adventure games](https://en.wikipedia.org/wiki/Adventure_game) include puzzle elements in level design, a true puzzle game focuses on puzzle solving as its primary gameplay activity.[[1]](https://en.wikipedia.org/wiki/Puzzle_video_game#cite_note-fundamentals-1)

Rather than presenting a random collection of puzzles to solve, puzzle games typically offer a series of related puzzles that are a variation on a single theme.

### Trial-and-Error**[**[**edit**](https://en.wikipedia.org/w/index.php?title=Puzzle_video_game&action=edit&section=6)**]**

This sub-genre includes point-n-click games that often exhibit similarities with adventure games and walking simulators. Unlike logical puzzle games, these games generally require [inductive reasoning](https://en.wikipedia.org/wiki/Inductive_reasoning) to solve. The defining trait is that you must experiment with mechanisms in each level before you can solve them. Puzzle elements often do not have consistency throughout the game, and thus require guessing and checking.

These include *[Myst](https://en.wikipedia.org/wiki/Myst" \o "Myst)*, [*Limbo*](https://en.wikipedia.org/wiki/Limbo_(video_game)), [*The Dig*](https://en.wikipedia.org/wiki/The_Dig_(video_game)), [*Monument Valley*](https://en.wikipedia.org/wiki/Monument_Valley_(video_game)), and [escape room](https://en.wikipedia.org/wiki/Escape_the_room) games such as [*The Room*](https://en.wikipedia.org/wiki/The_Room_(video_game)).