



# System Design: YouTube

Let's understand the basic details to design the YouTube service.

## We'll cover the following ^

- What is YouTube?
- YouTube's popularity
- YouTube's growth
- How will we design YouTube?

## What is YouTube?

YouTube is a popular video streaming service where users upload, stream, search, comment, share, and like or dislike videos. Large businesses as well as individuals maintain channels where they host their videos. YouTube allows free hosting of video content to be shared with users globally. YouTube is considered a primary source of entertainment, especially among young people, and as of 2022, it is listed as the second-most viewed website after Google by [Wikipedia](#).



A depiction of a content creator uploading a video to YouTube that is streamed by many viewers

## YouTube's popularity



Some of the reasons why YouTube has gained popularity over the years include the following reasons:

- **Simplicity:** YouTube has a simple yet powerful interface.
- **Rich content:** Its simple interface and free hosting has attracted a large number of content creators.
- **Continuous improvement:** The development team of YouTube has worked relentlessly to meet scalability requirements over time. Additionally, Google acquired YouTube in 2007, which has added to its credibility.
- **Source of income:** YouTube coined a partnership program where it allowed content creators to earn money with their viral content.

Apart from the above reasons, YouTube also partnered up with well-established market giants like CNN and NBC to set a stronger foothold.

## YouTube's growth

Let's look at some interesting statistics about YouTube and its popularity.

Since its inception in February 2005, the number of YouTube users has multiplied. As of now, there are more than 2.5 billion monthly active users of YouTube. Let's take a look at the chart below to see how YouTube users have increased in the last decade.



Increase in monthly active users of YouTube per year

YouTube is the second most-streamed website after Netflix. A total of 694,000 hours of video content is streamed on YouTube per minute!



Let's evaluate your understanding of the building blocks required in the design of YouTube. Based on the functional and nonfunctional requirements given below, identify three key building blocks needed to curate the design of YouTube.

- **Functional requirements:**

- Stream videos
- Upload videos
- Search videos according to titles
- Like and dislike videos
- Add comments to videos
- View thumbnails

- **Nonfunctional requirements:**

- High availability



- Scalability
- Good performance

You should focus on the building blocks required for back-end storage and efficient data transmission to end users. Please also specify the reason(s) behind the selection of a building block.

💡 Want to know the correct answer?

List three key building blocks necessary to design a system like YouTube.

H<sub>1</sub> H<sub>2</sub> H<sub>3</sub> | **B** *I* | :≡ <sup>1</sup>/<sub>3</sub>≡ | ≡ ≡ ≡ | ✕

Provide your answer here!

Let's understand how to design YouTube in the next lessons.

## How will we design YouTube?

We've divided the design of YouTube into five lessons:

1. **Requirements**: This is where we identify the functional and non-functional requirements. We also estimate the resources required to serve millions of users each day. This lesson answers questions like how much storage space YouTube will need to store 500 hours of video content uploaded to YouTube per minute.
2. **Design**: In this lesson, we explain how we'll design the YouTube service. We also briefly explain the API design and database schemas. Lastly, we will also briefly go over how YouTube's search works.
3. **Evaluation**: This lesson explains how YouTube is able to fulfill all the requirements through the proposed design. It also looks at how scaling in the future can affect the system and what solutions are required to deal with scaling problems.

4. **Reality is more complicated:** During this lesson, we'll explore different techniques that YouTube employs to deliver content effectively to the client and avoid network congestions

