**DATABSES**

A **database** is an organized collection of [data](https://en.wikipedia.org/wiki/Data_(computing)).[[1]](https://en.wikipedia.org/wiki/Database#cite_note-1) A [relational database](https://en.wikipedia.org/wiki/Relational_database), more restrictively, is a collection of [schemas](https://en.wikipedia.org/wiki/Database_schema), [tables](https://en.wikipedia.org/wiki/Table_(database)), [queries](https://en.wikipedia.org/wiki/Query_language), reports, [views](https://en.wikipedia.org/wiki/View_(SQL)), and other elements. A **database-management system** (**DBMS**) is a [computer-software](https://en.wikipedia.org/wiki/Computer_software) [application](https://en.wikipedia.org/wiki/Application_software) that interacts with [end-users](https://en.wikipedia.org/wiki/End-user), other applications, and the database itself to capture and analyze data. A general-purpose DBMS allows the definition, creation, querying, update, and administration of databases.

Relational databases are also called Relational Database Management Systems (RDBMS) or SQL databases. Historically, the most popular of these have been Microsoft SQL Server, Oracle Database, MySQL, and IBM DB2. The RDBMS’s are used mostly in large enterprise scenarios, with the exception of MySQL, which is also used to store data for Web applications.

All relational databases can be used to manage transaction-oriented applications (OLTP), and most non-relational databases, in the categories of Document Stores and Column Stores, can also be used for OLTP, adding to the confusion between them.  OLTP databases can be thought of as “operational” databases, characterized by frequent, short transactions that include updates, touch a small amount of data, and provide concurrency to thousands (if not more) of transactions (some examples include banking applications and online reservations).

Non-relational databases are also called NoSQL databases. NoSQL has become an industry standard term, but the name is beginning to lose popularity since it doesn’t fully cover the complexity and range of non-relational data stores that are available. Some of the most known NoSQL or non-relational DBs that Serra discussed are MongoDB, DocumentDB, Cassandra, Coachbase, HBase, Redis, and Neo4j. There are literally hundreds, if not thousands, more.

**Relational Databases**

**Pros**

* Relational databases work with structured data.
* They support ACID transactional consistency and support “joins.”
* They come with built-in data integrity and a large eco-system.
* Relationships in this system have constraints.
* There is limitless indexing. Strong SQL.

**Cons**

* Relational Databases do not scale out horizontally very well (concurrency and data size), only vertically, (unless you use sharding).
* Data is normalized, meaning lots of joins, which affects speed.
* They have problems working with semi-structured data.

**Non-relational/NoSQL**

**Pros**

* They scale out horizontally and work with unstructured and semi-structured data. Some support ACID transactional consistency.
* Schema-free or Schema-on-read options.
* High availability.
* While many NoSQL databases are open source and so “free”, there are often considerable training, setup, and developments costs. There are now also numerous commercial products available.

**Cons**

* Weaker or eventual consistency (BASE) instead of ACID.
* Limited support for joins.
* Data is denormalized, requiring mass updates (i.e. product name change).
* Does not have built-in data integrity (must do in code).
* Limited indexing.

**OS**

An **operating system** (**OS**) is [system software](https://en.wikipedia.org/wiki/System_software) that manages [computer hardware](https://en.wikipedia.org/wiki/Computer_hardware) and [software](https://en.wikipedia.org/wiki/Computer_software) resources and provides common [services](https://en.wikipedia.org/wiki/Daemon_(computing)) for [computer programs](https://en.wikipedia.org/wiki/Computer_program).

The dominant desktop operating system is [Microsoft Windows](https://en.wikipedia.org/wiki/Microsoft_Windows) with a market share of around 82.74%. [macOS](https://en.wikipedia.org/wiki/MacOS) by [Apple Inc.](https://en.wikipedia.org/wiki/Apple_Inc.) is in second place (13.23%), and the varieties of [Linux](https://en.wikipedia.org/wiki/Linux) are collectively in third place (1.57%).[[3]](https://en.wikipedia.org/wiki/Operating_system#cite_note-3) In the [mobile](https://en.wikipedia.org/wiki/Mobile_operating_system) ([smartphone](https://en.wikipedia.org/wiki/Smartphone) and [tablet](https://en.wikipedia.org/wiki/Tablet_computer) combined) sector, use in 2017 is up to 70% of [Google](https://en.wikipedia.org/wiki/Google)'s [Android](https://en.wikipedia.org/wiki/Android_(operating_system))[[4]](https://en.wikipedia.org/wiki/Operating_system#cite_note-4) and according to third quarter 2016 data, Android on smartphones is dominant with 87.5 percent and a growth rate 10.3 percent per year, followed by [Apple](https://en.wikipedia.org/wiki/Apple_Inc.)'s [iOS](https://en.wikipedia.org/wiki/IOS) with 12.1 percent and a per year decrease in market share of 5.2 percent, while other operating systems amount to just 0.3 percent.[[5]](https://en.wikipedia.org/wiki/Operating_system#cite_note-5) [Linux distributions](https://en.wikipedia.org/wiki/Linux_distribution) are dominant in the server and supercomputing sectors. Other specialized classes of operating systems, such as embedded and real-time systems, exist for many applications.

Types of operating systems

**Single- and multi-tasking**

**Single- and multi-user**

**Distributed**

A [distributed operating system](https://en.wikipedia.org/wiki/Distributed_operating_system) manages a group of distinct computers and makes them appear to be a single computer. The development of networked computers that could be linked and communicate with each other gave rise to distributed computing. Distributed computations are carried out on more than one machine. When computers in a group work in cooperation, they form a distributed system.[[7]](https://en.wikipedia.org/wiki/Operating_system#cite_note-7)

**Unix and Unix-like operating systems**

**macOS** (formerly "Mac OS X" and later "OS X") is a line of [open core](https://en.wikipedia.org/wiki/Open_core) graphical operating systems developed, marketed, and sold by [Apple Inc.](https://en.wikipedia.org/wiki/Apple_Inc.), the latest of which is pre-loaded on all currently shipping [Macintosh](https://en.wikipedia.org/wiki/Macintosh) computers. macOS is the successor to the original [classic Mac OS](https://en.wikipedia.org/wiki/Classic_Mac_OS), which had been Apple's primary operating system since 1984. Unlike its predecessor, macOS is a [UNIX](https://en.wikipedia.org/wiki/UNIX)operating system built on technology that had been developed at [NeXT](https://en.wikipedia.org/wiki/NeXT) through the second half of the 1980s and up until Apple purchased the company in early 1997. The operating system was first released in 1999 as [Mac OS X Server 1.0](https://en.wikipedia.org/wiki/Mac_OS_X_Server_1.0), followed in March 2001 by a client version ([Mac OS X v10.0 "Cheetah"](https://en.wikipedia.org/wiki/Mac_OS_X_v10.0)). Since then, six more distinct "client" and "[server](https://en.wikipedia.org/wiki/MacOS_Server)" editions of macOS have been released, until the two were merged in [OS X 10.7 "Lion"](https://en.wikipedia.org/wiki/Mac_OS_X_Lion).

**Linux**

*Main articles: [Linux](https://en.wikipedia.org/wiki/Linux) and [Linux kernel](https://en.wikipedia.org/wiki/Linux_kernel)*

[Ubuntu](https://en.wikipedia.org/wiki/Ubuntu_(operating_system)), desktop [Linux distribution](https://en.wikipedia.org/wiki/Linux_distribution)

The Linux kernel originated in 1991, as a project of [Linus Torvalds](https://en.wikipedia.org/wiki/Linus_Torvalds), while a university student in Finland. He posted information about his project on a newsgroup for computer students and programmers, and received support and assistance from volunteers who succeeded in creating a complete and functional kernel.

**Microsoft Windows**

Microsoft Windows is a family of [proprietary](https://en.wikipedia.org/wiki/Proprietary_software) operating systems designed by [Microsoft Corporation](https://en.wikipedia.org/wiki/Microsoft) and primarily targeted to Intel architecture based computers, with an estimated 88.9 percent total usage share on Web connected computers.[[15]](https://en.wikipedia.org/wiki/Operating_system#cite_note-StatCounter-15)[[19]](https://en.wikipedia.org/wiki/Operating_system#cite_note-19)[[20]](https://en.wikipedia.org/wiki/Operating_system#cite_note-w3cstats-20)[[21]](https://en.wikipedia.org/wiki/Operating_system#cite_note-21) The latest version is [Windows 10](https://en.wikipedia.org/wiki/Windows_10).

In 2011, Windows 7 overtook Windows XP as most common version in use.[[22]](https://en.wikipedia.org/wiki/Operating_system#cite_note-w3schoolsOSStats-22)[[23]](https://en.wikipedia.org/wiki/Operating_system#cite_note-gstats2011-23)[[24]](https://en.wikipedia.org/wiki/Operating_system#cite_note-globstats-24)

Microsoft Windows was first released in 1985, as an [operating environment](https://en.wikipedia.org/wiki/Operating_environment) running on top of [MS-DOS](https://en.wikipedia.org/wiki/MS-DOS), which was the standard operating system shipped on most Intel architecture personal computers at the time. In 1995, [Windows 95](https://en.wikipedia.org/wiki/Windows_95) was released which only used MS-DOS as a bootstrap. For backwards compatibility, Win9x could run real-mode MS-DOS[[25]](https://en.wikipedia.org/wiki/Operating_system#cite_note-25)[[26]](https://en.wikipedia.org/wiki/Operating_system#cite_note-26) and 16-bit [Windows 3.x](https://en.wikipedia.org/wiki/Windows_3.x)[[27]](https://en.wikipedia.org/wiki/Operating_system#cite_note-27) drivers. [Windows ME](https://en.wikipedia.org/wiki/Windows_ME), released in 2000, was the last version in the Win9x family. Later versions have all been based on the [Windows NT](https://en.wikipedia.org/wiki/Windows_NT) [kernel](https://en.wikipedia.org/wiki/Kernel_(computing)). Current client versions of Windows run on [IA-32](https://en.wikipedia.org/wiki/IA-32), [x86-64](https://en.wikipedia.org/wiki/X86-64) and 32-bit [ARM](https://en.wikipedia.org/wiki/ARMv7) [microprocessors](https://en.wikipedia.org/wiki/Microprocessor).[[28]](https://en.wikipedia.org/wiki/Operating_system#cite_note-28) In addition [Itanium](https://en.wikipedia.org/wiki/Itanium) is still supported in older server version [Windows Server 2008 R2](https://en.wikipedia.org/wiki/Windows_Server_2008_R2). In the past, Windows NT supported additional architectures.