

# What is Python? Executive Summary

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very effective.

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

Lists and tuples are Python data structures. The list is dynamic and whereas the tuple has static characteristics. They both have various advantages and use cases.

## List

The list is the mutable data type, consumes more memory, and it is better for element insertion and deletion. Furthermore, it has several building functions, and the implication of iterations is slower compared to Tuple.

## Example of List

```
a_list = ["Data", "Camp", "Tutorial"]
```

It is known as a constructor in OOP terminology. It is used to initiate a state when you create a new object. For example, you can assign values to object properties or run the operations that are necessary when the object is created.

The `__init__()` method is reserved for Python classes, and it is called automatically when you create a new object.

Example:

We have created a `'book_shop'` class and added the constructor and `'book()'` function. The constructor will store the book title name and the `'book()'` function will print the book name.

To test our code we have initialized the `'b'` object with "Sandman" and executed the `'book()'` function.

The mutable Python data types can be modified, and they can change at runtime, for example, a List, Dictionary, and Set.

The immutable Python data types can not be changed or modified, and they remain unchanged during runtime, for example, a Numeric, String, and Tuple.

4. Explain List, Dictionary, and Tuple comprehension with an example.

List comprehension offers one-liner syntax to create a new list based on the values of the existing list. You can use a `'for loop'` to replicate the same thing, but it will require you to write multiple lines, and sometimes it can get complex.

List comprehension eases the creation of the list based on existing iterable.

5. What is monkey patching in Python?

Monkey patching in Python is a dynamic technique that can change the behavior of the code at run-time. In short, you can modify a class or module at run-time.

Example:

Let's learn monkey patching with an example.

1. We have created a class `'monkey'` with a `'patch()'` function. We have also created a `'monk_p'` function outside the class.

2. We will now replace the `'patch'` with the `'monk_p'` function by assigning `'monkey.patch'` to `'monk_p'`.

3. In the end, we will test the modification by creating the object using the `'monkey'` class and running the `'patch()'` function.

Elon Reeve Musk is a [business magnate](#) and investor. He is the founder, CEO and chief engineer of [SpaceX](#); [angel investor](#), CEO and product architect of [Tesla, Inc.](#); owner and CTO of [Twitter](#); founder of [the Boring Company](#); co-founder of [Neuralink](#) and [OpenAI](#); and president of the philanthropic [Musk Foundation](#). Musk is the wealthiest person in the world, with an estimated net worth, as of July 12, 2023, of around US\$239 billion according to the [Bloomberg](#)

Musk was born in [Pretoria](#), South Africa, and briefly attended the [University of Pretoria](#) before moving to Canada at age 18, acquiring citizenship through his Canadian-born mother. Two years later, he [matriculated](#) at [Queen's University](#) in Kingston, Ontario, Canada. and transferred to the [University of Pennsylvania](#), where he received bachelor's degrees in economics and physics. He moved to California in 1995 to attend [Stanford University](#). After two days, he dropped out and, with his brother [Kimbal](#), co-founded the online [city guide](#) software company [Zip2](#). Zip2 was acquired by [Compaq](#) for \$307 million in 1999, and with \$12 million of the money he made, that same year Musk co-founded [X.com](#), a [direct bank](#). X.com merged with [Confinity](#) in 2000 to form [PayPal](#).

Musk has [expressed views](#) that have made him a polarizing figure. He has been criticized for making unscientific and misleading statements, including that of spreading [COVID-19 misinformation](#). In 2018, the [U.S. Securities and Exchange Commission](#) (SEC) sued Musk for falsely tweeting that he had secured funding for a private takeover of Tesla. To settle the case, Musk stepped down as chairman of Tesla and paid a \$20 million fine.

In 1995, Musk, his brother Kimbal, and Greg Kouri founded [Zip2](#).<sup>[49][50]</sup> Errol Musk provided them with \$28,000 in funding.<sup>[51]</sup> The company developed an Internet [city guide](#) with maps, directions, and [yellow pages](#), and marketed it to newspapers.<sup>[52]</sup> They worked at a small rented office in [Palo Alto](#),<sup>[53]</sup> Musk coding the website every night.<sup>[53]</sup> Eventually, Zip2 obtained contracts with [The New York Times](#) and the [Chicago Tribune](#).<sup>[43]</sup> The brothers persuaded the board of directors to abandon a merger with [CitySearch](#);<sup>[54]</sup> however, Musk's attempts to become CEO were thwarted.<sup>[55]</sup> [Compaq](#) acquired Zip2 for \$307 million in cash in February 1999,<sup>[56][57]</sup> and Musk received \$22 million for his 7-percent share.<sup>[58]</sup>

In 2015, SpaceX began development of the [Starlink](#) constellation of low-Earth-orbit satellites to provide [satellite Internet access](#),<sup>[93]</sup> with the first two prototype satellites launched in February 2018. A second set of test satellites, and the first large deployment of a piece of the constellation, occurred in May 2019, when the first 60 operational satellites were launched.<sup>[94]</sup> The total cost of the decade-long project to design, build, and deploy the constellation is estimated by SpaceX to be about \$10 billion.<sup>[95][c]</sup> Some critics, including the [International Astronomical Union](#), have alleged that Starlink [blocks the view of the sky](#) and poses a collision threat to spacecraft.<sup>[98][99][100]</sup>

During the [Russian invasion of Ukraine](#), Musk sent [Starlink terminals to Ukraine](#) to provide Internet access and communication.<sup>[101]</sup> However, Musk refused to block [Russian state media](#) on Starlink, declaring himself "a [free speech](#) absolutist".<sup>[102][103]</sup>

In October 2022, Musk stated that about 20,000 satellite [terminals](#) had been donated to Ukraine, together with free data transfer subscriptions, which cost SpaceX \$80 million. After asking the [United States Department of Defense](#) to pay for further units and future subscriptions on behalf of Ukraine,<sup>[104]</sup> Musk publicly stated that SpaceX would continue to provide Starlink to Ukraine for free, at a yearly cost to itself of \$400 million.<sup>[105][106][107]</sup>

[Tesla, Inc.](#)—originally Tesla Motors—was incorporated in July 2003 by [Martin Eberhard](#) and [Marc Tarpenning](#), who financed the company until the [Series A round](#) of funding. Both men played active roles in the company's early development prior to Musk's involvement.<sup>[108]</sup> Musk led the Series A

round of investment in February 2004; he invested \$6.5 million, became the majority shareholder, and joined Tesla's board of directors as chairman.<sup>[109]</sup> Musk took an active role within the company and oversaw [Roadster](#) product design but was not deeply involved in day-to-day business operations.<sup>[110]</sup>

Following a series of escalating conflicts in 2007, and the [financial crisis of 2007–2008](#), Eberhard was ousted from the firm.<sup>[111]</sup><sup>[page needed]</sup><sup>[112]</sup> Musk assumed leadership of the company as CEO and product architect in 2008.<sup>[113]</sup> A 2009 lawsuit settlement with Eberhard designated Musk as a Tesla co-founder, along with Tarpenning and two others.<sup>[114]</sup><sup>[115]</sup> As of 2019, Musk was the longest-tenured CEO of any automotive manufacturer globally.<sup>[116]</sup> In 2021, Musk nominally changed his title to "Technoking" while retaining his position as CEO.<sup>[117]</sup>

Narendra Damodardas Modi born 17 September 1950)<sup>[b]</sup> is an Indian politician who has served as the [14th Prime Minister of India](#) since May 2014. Modi was the [Chief Minister of Gujarat](#) from 2001 to 2014 and is the [Member of Parliament](#) (MP) for [Varanasi](#). He is a member of the [Bharatiya Janata Party](#) (BJP) and of the [Rashtriya Swayamsevak Sangh](#) (RSS), a right-wing [Hindu nationalist](#) paramilitary volunteer organisation. He is the longest-serving non-[Congress](#) prime minister and the fourth longest-serving prime minister of all time.

Born and raised in [Vadnagar](#) in northeastern [Gujarat](#), Modi became a full-time worker for the RSS in Gujarat in 1971. After the [state of emergency](#) was declared by Prime Minister [Indira Gandhi](#) in 1975, he went into hiding. The RSS assigned him to the BJP in 1985 and he held several positions within the party hierarchy until 2001, rising to the rank of general secretary.<sup>[c]</sup>

In 2001, Modi was appointed Chief Minister of Gujarat and was elected to the legislative assembly soon after. His administration is considered complicit in the [2002 Gujarat riots](#),<sup>[d]</sup> which resulted in 1,000 to 2,000 deaths, and Modi has been criticised and investigated for his handling of the crisis, but no formal proceedings have been launched against him.<sup>[10]</sup><sup>[e]</sup> His policies as chief minister were credited for encouraging economic growth, but Modi's administration was also criticised for its record on health, poverty and education indices in the state.<sup>[f]</sup>

Narendra Damodardas Modi was born on 17 September 1950 to a [Gujarati Hindu](#) family of grocers in [Vadnagar](#), [Mehsana district](#), [Bombay State](#) (present-day [Gujarat](#)). He was the third of six children born to Damodardas Mulchand Modi ( 1915–1989) and Hiraben Modi (1923–2022).<sup>[47]</sup><sup>[b]</sup><sup>[48]</sup> His family belonged to the [Modh-Ghanchi-Teli](#) (oil-presser) community,<sup>[49]</sup><sup>[50]</sup><sup>[51]</sup> which the Indian government has categorised as an [Other Backward Class](#).<sup>[51]</sup><sup>[52]</sup>

According to Modi, as a child, he had to work in his father's tea shop on the platform of [Vadnagar railway station](#),<sup>[53]</sup> but the evidence of his neighbours does not entirely corroborate this statement.<sup>[54]</sup><sup>[55]</sup> During a protest against the government, his brother, Prahlad Modi, contradicted that he ever sold tea. According to him, his father had brought up six of his children by selling tea and people were making a big mistake by calling the Prime Minister a "chai wala" (tea seller).<sup>[56]</sup>

Modi completed his [higher secondary education](#) in Vadnagar in 1967; his teachers described him as an average student and a keen, gifted debater with an interest in theatre.<sup>[57]</sup> He preferred playing larger-than-life characters in theatrical productions, which has influenced his political image.<sup>[58]</sup><sup>[59]</sup>

When Modi was eight years old, he was introduced to the [Rashtriya Swayamsevak Sangh](#) (RSS) and began attending its local *shakhas* (training sessions). There, he met [Lakshmanrao Inamdar](#), who inducted Modi as a *balswayamsevak* (junior cadet) in the RSS and became his political mentor.<sup>[60]</sup> While Modi was training with the RSS, he also met Vasant Gajendragadkar and Nathalal Jaghda, [Bharatiya Jana Sangh](#) leaders who in 1980 helped found the BJP's Gujarat unit.<sup>[61]</sup>

Rama is a major deity in [Hinduism](#). He is the seventh and one of the most popular *avatars* of [Vishnu](#). In Rama-centric traditions of Hinduism, he is considered the Supreme Being.<sup>[5]</sup>

Rama was born to [Kaushalya](#) and [Dasharatha](#) in [Ayodhya](#), the capital of the Kingdom of [Kosala](#). His siblings included [Lakshmana](#), [Bharata](#), and [Shatrughna](#). He married [Sita](#). Though born in a royal family, Rama's life is described in the Hindu texts as one challenged by unexpected changes such as an exile into impoverished and difficult circumstances, ethical questions and moral dilemmas.<sup>[6]</sup> Of all his travails, the most notable is the kidnapping of Sita by demon-king [Ravana](#), followed by the determined and epic efforts of Rama and Lakshmana to gain her freedom and destroy the evil Ravana against great odds. The entire life story of Rama, Sita and their companions allegorically discusses duties, rights and social responsibilities of an individual. It illustrates [dharma](#) and dharmic living through model characters.<sup>[6][7]</sup>

Rama is especially important to [Vaishnavism](#). He is the central figure of the ancient Hindu epic *Ramayana*, a text historically popular in the South Asian and Southeast Asian cultures.<sup>[8][9][10]</sup> His ancient legends have attracted [bhasya](#) (commentaries) and extensive secondary literature and inspired performance arts. Two such texts, for example, are the *Adhyatma Ramayana* – a spiritual and theological treatise considered foundational by [Ramanandi](#) monasteries,<sup>[11]</sup> and the *Ramcharitmanas* – a popular treatise that inspires thousands of [Ramlila](#) festival performances during autumn every year in India.<sup>[12][13][14]</sup>

Rama legends are also found in the texts of [Jainism](#) and [Buddhism](#), though he is sometimes called Pauma or Padma in these texts,<sup>[15]</sup> and their details vary significantly from the Hindu versions.<sup>[16]</sup> [Jain Texts](#) also mentioned [Rama](#) as the eighth [balabhadra](#) among the 63 [salakapurusas](#).<sup>[17][18][19]</sup> In [Sikhism](#), Rama is mentioned as one of twenty four divine avatars of Vishnu in the *Chaubis Avtar* in *Dasam Granth*.<sup>[20]</sup>

The name Rama appears repeatedly in Hindu texts, for many different scholars and kings in mythical stories.<sup>[23]</sup> The word also appears in ancient [Upanishads](#) and [Aranyakas](#) layer of Vedic literature, as well as music and other post-Vedic literature, but in qualifying context of something or someone who is "charming, beautiful, lovely" or "darkness, night".<sup>[23]</sup>

The Vishnu avatar named Rama is also known by other names. He is called *Ramachandra* (beautiful, lovely moon),<sup>[24]</sup> or *Dasarathi* (son of Dasaratha), or *Raghava* (descendant of Raghu, solar dynasty in Hindu cosmology).<sup>[23][26]</sup> He is also known as Ram Lalla (*Infant form of Rama*).<sup>[27]</sup>

Additional names of Rama include *Ramavijaya* ([Javanese](#)), *Phreah Ream* ([Khmer](#)), *Phra Ram* ([Lao](#) and [Thai](#)), *Megat Seri Rama* ([Malay](#)), *Raja Bantugan* ([Maranao](#)), *Ramudu* ([Telugu](#)), *Ramar* ([Tamil](#)).<sup>[28]</sup> In the *Vishnu sahasranama*, Rama is the 394th name of [Vishnu](#). In some Advaita Vedanta inspired texts, Rama connotes the metaphysical concept of Supreme [Brahman](#) who is the eternally blissful spiritual Self (Atman, soul) in whom [yogis](#) delight nondualistically.<sup>[29]</sup>

The root of the word *Rama* is *ram-* which means "stop, stand still, rest, rejoice, be pleased".<sup>[24]</sup>

According to [Douglas Q. Adams](#), the Sanskrit word *Rama* is also found in other Indo-European languages such as [Tocharian](#) *ram*, *reme*, *\*romo-* where it means "support, make still", "witness, make evident".<sup>[24][30]</sup> The sense of "dark, black, soot" also appears in other Indo European languages, such as *\*remos* or Old English *romig*.<sup>[31][8]</sup>

The ancient epic *Ramayana* states in the *Balakhanda* that Rama and his brothers were born to Kaushalya and Dasharatha in [Ayodhya](#), a city on the banks of [Sarayu River](#).<sup>[34][35]</sup> The Jain versions of the *Ramayana*, such as the *Paumacariya* (literally deeds of Padma) by Vimalasuri, also mention the details of the early life of Rama. The Jain texts are dated variously, but generally pre-500 CE, most likely sometime within the first five centuries of the common era.<sup>[36]</sup> [Moriz Winternitz](#) states that the *Valmiki Ramayana* was already famous before it was recast in the Jain *Paumacariya* poem, dated to the second half of the 1st century CE, which pre-dates a similar retelling found in the *Buddha-carita* of Asvagosha, dated to the beginning of the 2nd century CE or prior.<sup>[37]</sup>

[Dasharatha](#) was the king of [Kosala](#), and a part of the [solar dynasty](#) of [Ikshvaku](#). His mother's name [Kaushalya](#) literally implies that she was from Kosala. The kingdom of Kosala is also mentioned in [Buddhist](#) and [Jain texts](#), as one of the sixteen *Maha janapadas* of [ancient India](#), and as an important center of pilgrimage for Jains and Buddhists.<sup>[34][38]</sup> However, there is a scholarly dispute whether the modern Ayodhya is indeed the same as the Ayodhya and Kosala mentioned in the *Ramayana* and other ancient Indian texts.<sup>[39][y]</sup>

Rama's birth, according to *Ramayana*, is an incarnation of God (*Vishnu*) as human. When demigods went to *Brahma* to seek liberation from Ravana's menace on the Earth (due to powers he had from Brahma's boon to him), *Vishnu* himself appeared and said he will incarnate as *Rama* (human) and kill *Ravana* (since *Brahma*'s boon made him invincible from all, including God, except humans).<sup>[41]</sup>

**Yogi Adityanath** (born **Ajay Mohan Singh Bisht**; 5 June 1972)<sup>[6][1][7][a][9]</sup> is an Indian [Hindu](#) monk and politician from the [Bharatiya Janata Party](#) who is serving as the 21st and current [Chief Minister of Uttar Pradesh](#) since 19 March 2017. He is also the longest serving Chief Minister of [Uttar Pradesh](#), who is currently running his tenure for over 6 years, surpassing [Sampurnanand](#).<sup>[10]</sup> He represents [Gorakhpur Urban Assembly constituency](#) in the [Uttar Pradesh Legislative Assembly](#) since 2022 and was member of the [Uttar Pradesh Legislative Council](#) from 2017 to 2022. He is a former [Member of Parliament, Lok Sabha](#) from [Gorakhpur Lok Sabha constituency, Uttar Pradesh](#) from 1998 to 2017 before he resigned to become the Chief Minister.<sup>[11]</sup> He resigned from the [legislative council](#) after being elected to the [legislative assembly](#).

Adityanath is also the *mahant* (Head Priest) of the [Gorakhnath Math](#), a [Hindu monastery](#) in [Gorakhpur](#), a position he has held since September 2014 following the death

of [Mahant Avidyanath](#), his spiritual "father".<sup>[12]</sup> He is also the founder of [Hindu Yuva Vahini](#), a Hindu nationalist organisation.<sup>[13][14]</sup> He has an image of a [Hindutva nationalist](#) and a [social conservative](#).<sup>[1][15][16][17][18]</sup>