

# Assignment 03 Report

## (2024210009)

### Objective

The objective of this assignment is to develop a Python-based application that retrieves historical stock price data from **Macrotrends**, processing the data using the *BeautifulSoup* library for web scraping and visualizing the data using *Bokeh* for plotting.

### Project Components

#### (a) Web Scraping and Data Extraction

- **Library Used:**
  - *requests* – To send HTTP requests to fetch the HTML content of the webpage.
  - *BeautifulSoup* – To parse the HTML content and extract relevant stock data tables.
- **Process:**
  - A valid stock ticker symbol is provided as input by user.
  - The code constructs a URL to fetch historical stock data from Macrotrends using *requests* library.
  - If the response is successful (`status_code == 200`), the HTML content is parsed using *BeautifulSoup*.
  - The data is extracted from two tables:
    - Table 1** – Contains yearly stock price data (avg stock price, year open, high, low, close, annual % change)
    - Table 2** – Contains additional financial data (Sector, Industry, Market Cap, revenue)

#### (b) Data Visualization

- **Library Used:**
  - *Bokeh* – For creating interactive plots.
- **Plot Generated:**
  - **Line Plot** – Displays the average stock price over the years.
  - **Bar Plot** – Displays the annual percentage change in stock prices.
- The x-axis and y-axis ranges are adjusted dynamically based on the extracted data.
- The plots are displayed side-by-side using the *row* layout of *Bokeh*.

#### (c) User Interaction

- The program asks the stock ticker symbol from the user.
- If the ticker is invalid or data is unavailable, an appropriate message is displayed.

### Results

- Successfully extracts and displays historical stock data.
- Provided a clean and structured terminal output for extracted data.
- Creates graphs that adjust dynamically to the data.

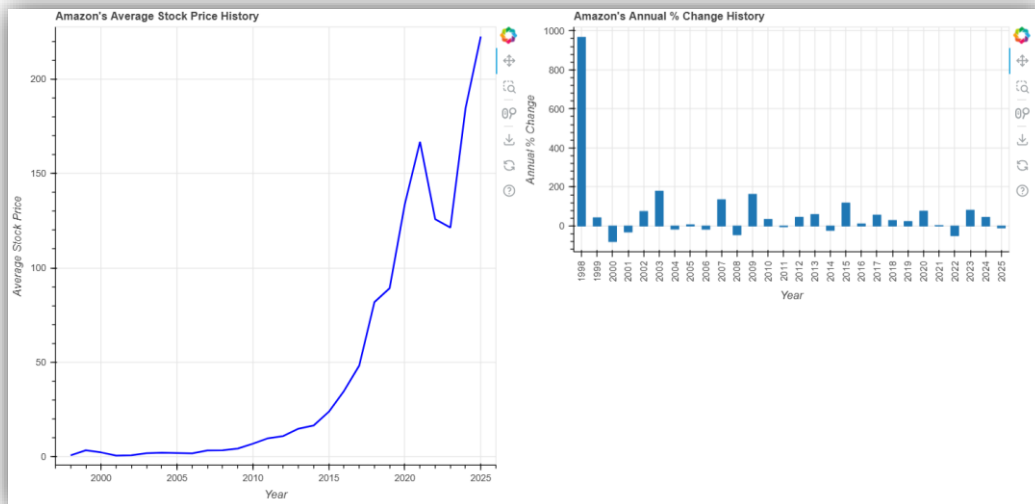
# AMAZON

Enter stock ticker symbol: AMZN

Amazon Historical Annual Stock Price Data

Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2025	222.5234	220.2200	242.0600	194.5400	198.8900	-9.34%
2024	184.6287	149.9300	232.9300	144.5700	219.3900	44.39%
2023	121.3728	85.8200	154.0700	83.1200	151.9400	80.88%
2022	125.7990	169.9951	169.9951	81.8200	84.0000	-49.49%
2021	166.7916	158.9487	186.1222	147.2429	166.3164	2.38%
2020	133.7207	94.6725	176.1483	83.6291	162.4552	76.26%
2019	89.2447	76.7716	100.8067	74.8338	92.1700	23.03%
2018	81.8891	59.3077	101.7305	59.3077	74.9181	28.43%
2017	48.2920	37.5930	59.6478	37.5930	58.3330	55.96%
2016	34.8921	31.7730	42.1166	24.0456	37.4034	10.95%
2015	23.8494	15.3889	34.6151	14.3130	33.7133	117.78%
2014	16.5876	19.8507	20.3036	14.3185	15.4802	-22.18%
2013	14.8658	12.8346	20.1709	12.3817	19.8916	58.96%
2012	10.9887	8.9300	13.0526	8.7754	12.5134	44.93%
2011	9.8100	9.1889	12.3059	8.0292	8.6342	-3.83%
2010	6.9403	6.6789	9.2158	5.4175	8.9784	33.81%
2009	4.3536	2.7115	7.0954	2.4162	6.7098	162.33%
2008	3.4856	4.8009	4.8009	1.7473	2.5578	-44.65%
2007	3.3532	1.9304	5.0289	1.8171	4.6209	134.77%
2006	1.7912	2.3733	2.3877	1.3004	1.9683	-16.31%
2005	1.9900	2.2207	2.4691	1.5822	2.3518	6.45%
2004	2.1730	2.5888	2.8521	1.6874	2.2092	-15.83%
2003	1.8823	0.9761	2.9883	0.9761	2.6247	178.57%
2002	0.8221	0.5467	1.2096	0.4554	0.9422	74.58%
2001	0.6086	0.6923	1.0914	0.2978	0.5397	-30.46%
2000	2.3219	4.4583	4.4583	0.7577	0.7761	-79.56%
1999	3.4450	2.9504	5.3222	2.1324	3.7974	42.17%
1998	0.7814	0.2473	2.9255	0.2125	2.6711	966.73%

Sector: Retail/Wholesale      Industry: Internet Commerce      Market Cap: \$2254.243B      Revenue: \$637.959B



- From 1998 to 2025, Amazon's stock price has shown significant long-term growth, with an upward trajectory.
- The stock price saw a particularly strong surge from the early 2010s onward, peaking in recent years.
- From 2010 to 2020, annual % changes were relatively consistent, with amazon experiencing **double, triple digit % gains** in most years.
- The stock experienced **a shard decline in 2022 (-49.49%)** after reaching a high in **2021**.
- However, it rebounded in **2023 (80.88%)** and continued to rise in **2024 (44.39%)**, showing recovery.

- The year 2025 Shows a **negative annual percentage change (-9.34%)**, indicating a recent downturn after strong growth in 2023-2024.
- Amazon's market cap is **\$2254.243 billion**, making it one of the most valuable companies in the world.
- Amazon's **\$637.959 billion revenue** suggesting strong investor confidence.

## TESLA

Enter stock ticker symbol: TSLA

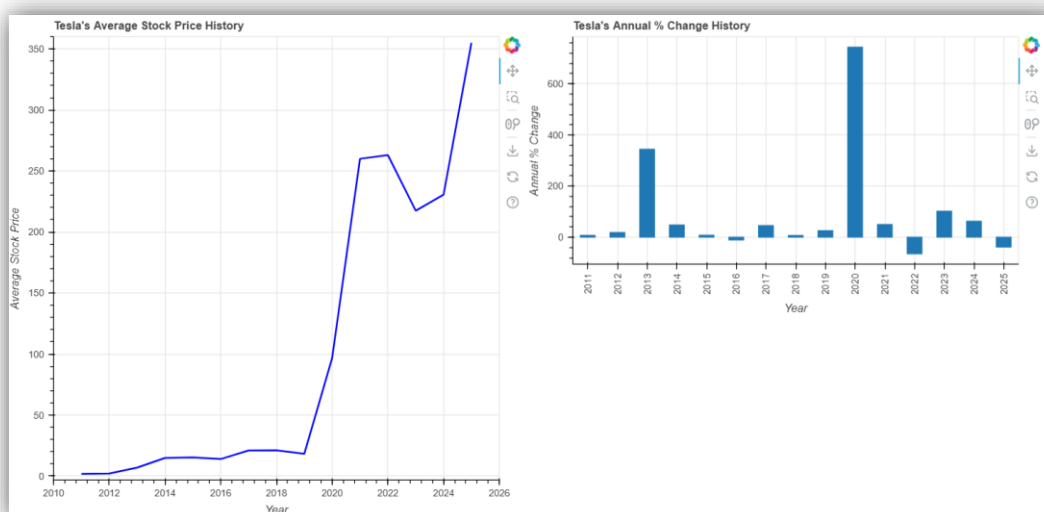
----- Tesla Historical Annual Stock Price Data -----

Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2025	355.0332	379.2800	428.2200	222.1500	248.0900	-38.57%
2024	230.6150	248.4200	479.8600	142.0500	403.8400	62.52%
2023	217.4752	108.1000	293.3400	108.1000	248.4800	101.72%
2022	263.0931	399.9267	399.9267	109.1000	123.1800	-65.03%
2021	259.9982	243.2567	409.9700	187.6667	352.2600	49.76%
2020	96.6657	28.6840	235.2233	24.0813	235.2233	743.44%
2019	18.2354	20.6747	28.7293	11.9313	27.8887	25.70%
2018	21.1540	21.3687	25.3047	16.7040	22.1867	6.89%
2017	20.9544	14.4660	25.6667	14.4660	20.7567	45.70%
2016	13.9845	14.8940	17.6947	9.5780	14.2460	-10.97%
2015	15.3362	14.6207	18.8173	12.3333	16.0007	7.91%
2014	14.8886	10.0067	19.0693	9.2893	14.8273	47.85%
2013	6.9601	2.3573	12.8913	2.1940	10.0286	344.14%
2012	2.0779	1.8720	2.5340	1.5193	2.2580	18.59%
2011	1.7870	1.7747	2.3293	1.4553	1.9040	7.25%

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Sector	Industry	Market Cap	Revenue
Auto/Tires/Trucks	Auto Manufacturers - Domestic	\$1063.155B	\$97.690B

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- Tesla's average stock price remained **relatively low from 2011 to 2019**, with moderate increases each year.
- After 2019, there was a **massive spike** in Tesla's stock price in 2020, with **an annual increase of 743.44%**, reflecting investor enthusiasm and strong business performance.
- 2021 saw another **increase (49.76%)** with a high closing price of **\$352.26**.

- However, 2022 experienced a **-65.03% decline**, showing major volatility.
- Tesla rebounded in 2023 and 2024, but 2025 data show a **decline again (-38.57%)**.
- Tesla has a **market cap of \$1063.155 billion**, indicating strong market influence.
- With **\$97.69 billion in revenue**, Tesla remains a major player in the auto industry.

## NETFLIX

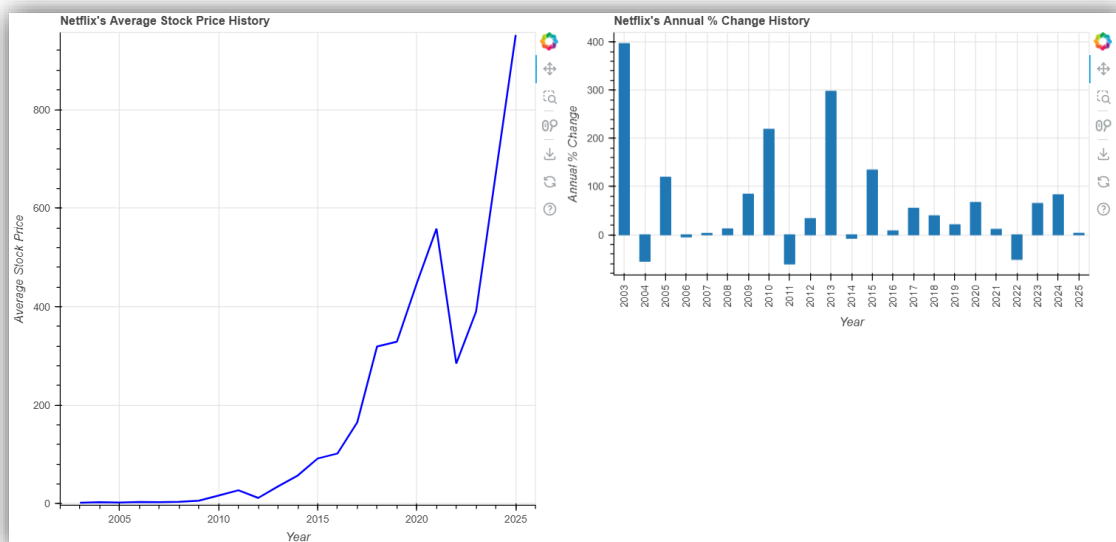
Enter stock ticker symbol: NFLX

Netflix Historical Annual Stock Price Data

Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2025	951.4696	886.7300	1058.6000	828.4000	919.6800	3.18%
2024	671.5002	468.5000	936.5600	468.5000	891.3200	83.07%
2023	390.2479	294.9500	495.0200	292.7600	486.8800	65.11%
2022	284.6392	597.3700	597.3700	166.3700	294.8800	-51.05%
2021	558.2177	522.8600	691.6900	484.9800	602.4400	11.41%
2020	446.8272	329.8100	556.5500	298.8400	540.7300	67.11%
2019	328.8713	267.6600	385.0300	254.5900	323.5700	20.89%
2018	319.2903	201.0700	418.9700	201.0700	267.6600	39.44%
2017	165.3743	127.4900	202.6800	127.4900	191.9600	55.06%
2016	102.0304	109.9600	128.3500	82.7900	123.8000	8.24%
2015	91.8956	49.8486	130.9300	45.5471	114.3800	134.38%
2014	57.4951	51.8314	69.1986	44.8871	48.8014	-7.21%
2013	35.2718	13.1443	54.3686	13.1443	52.5957	297.64%
2012	11.8551	10.3200	18.4643	7.6857	13.2271	33.63%
2011	27.4937	25.4871	42.6757	9.1226	9.8986	-60.56%
2010	16.8242	7.6400	29.4143	7.0186	25.1000	218.93%
2009	6.3220	4.2671	8.7329	4.2200	7.8700	84.31%
2008	4.0947	3.7643	5.8143	2.5629	4.2700	12.28%
2007	3.1239	3.8014	4.1000	2.2957	3.8029	2.94%
2006	3.6910	3.7214	4.5257	2.6529	3.6943	-4.43%
2005	2.5972	1.7029	4.2957	1.2900	3.8657	119.47%
2004	3.4134	3.9164	5.5471	1.3471	1.7614	-54.91%
2003	2.0813	0.8179	4.2571	0.7729	3.9064	396.74%

Sector	Industry	Market Cap	Revenue
Consumer Discretionary	Broadcasting - Radio & TV	\$422.825B	\$39.001B

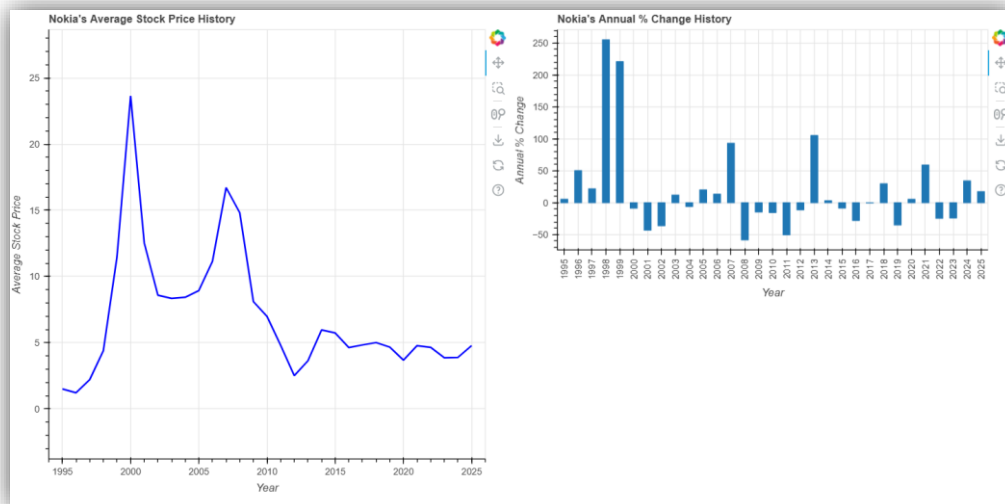


- Netflix's average stock price has shown an overall upward trajectory, with particularly steep growth starting around 2013 and accelerating in recent years.
- From 2013-2015, **rapid growth with 134.38%** in 2015.

- After 2015 to 2022, **massive spikes with positive annual growth**, the pandemic effect likely boosted stock price, showing **67.11% growth in 2020** and **11.41% in 2021**.
- The stock experienced a **shard decline in 2023**, dropping by **-51.05%** compared to 2022.
- However, it rebounded significantly in **2023 (+65.11%)** and **2024 (+83.07%)**.
- The **highest recorded stock price is in 2025 (\$951.47)**, indicating a strong bullish trend.
- **Highest annual growth occurred in 2003 (+396.74%)**, likely due to early adoption and expansion of Netflix's business model.
- 2013 also saw **major spikes (+297.64%)**, possibly due to the rapid success of Netflix's streaming service.
- Netflix has a **market cap of \$422.825 billion** and **revenue of \$39.001 billion**, indicating solid financial strength.
- The streaming industry remains competitive, but Netflix's stock performance suggests it continues to dominate and innovate.

## NOKIA

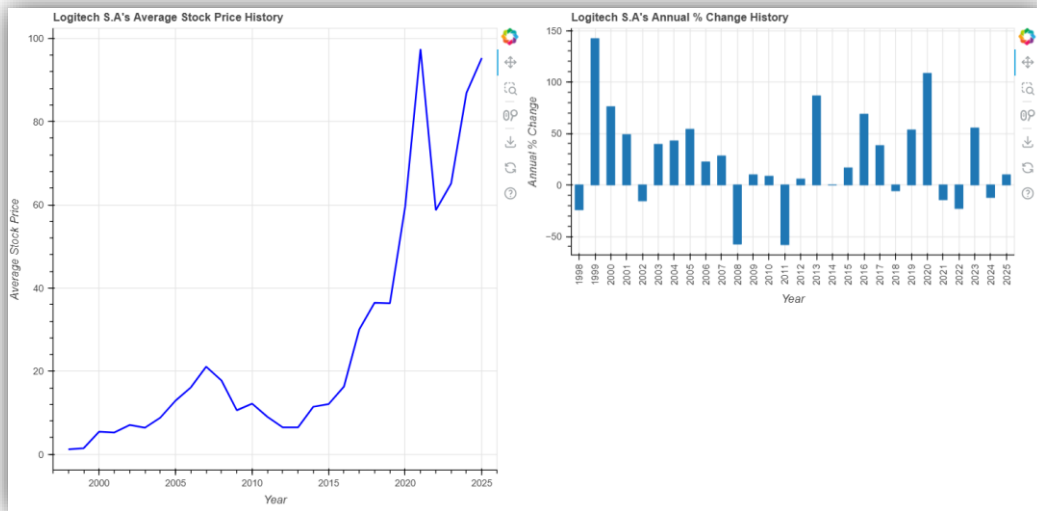
Nokia Historical Annual Stock Price Data						
Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2025	4.7800	4.4600	5.2300	4.4400	5.2000	17.38%
2024	3.8924	3.2910	4.9500	3.2115	4.4300	34.22%
2023	3.8617	4.3896	4.7078	2.8953	3.3006	-24.00%
2022	4.6437	5.8136	5.8136	3.8759	4.3428	-24.46%
2021	4.7799	3.5954	6.0539	3.5307	5.7489	59.08%
2020	3.6842	3.5769	4.7137	2.2367	3.6138	5.39%
2019	4.6684	5.1962	5.9748	3.0963	3.4290	-34.92%
2018	5.0103	4.1491	5.5612	4.1491	5.2687	29.71%
2017	4.8312	4.0378	5.7093	3.8262	4.0619	-0.24%
2016	4.6316	5.7733	5.9985	3.4876	4.0717	-27.87%
2015	5.7332	6.2871	6.5147	4.7200	5.6447	-8.50%
2014	5.9661	5.8536	6.7972	4.9099	6.1693	3.18%
2013	3.6345	3.0300	5.9789	2.2633	5.9789	105.31%
2012	2.5096	3.4971	3.9462	1.2459	2.9121	-11.20%
2011	4.8033	6.8203	7.5049	3.0685	3.2794	-50.33%
2010	6.9864	8.1184	9.5171	5.1312	6.6028	-15.50%
2009	8.1058	9.3711	9.8333	5.1254	7.8144	-14.58%
2008	14.8205	21.3513	21.8365	7.2423	9.1482	-58.26%
2007	16.7215	11.5380	23.4635	10.6556	21.9164	93.13%
2006	11.1486	10.2276	12.9007	9.6865	11.3481	13.44%
2005	8.9412	8.2860	10.1784	7.3984	10.0035	20.11%
2004	8.4324	8.9520	12.1064	5.8624	8.3285	-6.03%
2003	8.3483	8.5532	9.6194	6.4698	8.8634	11.98%
2002	8.5892	12.9112	13.5828	5.4945	7.9149	-36.10%
2001	12.5288	20.4336	22.3380	6.5389	12.3861	-43.03%
2000	23.6469	23.2864	30.9304	14.7154	21.7432	-8.63%
1999	11.4889	7.8939	23.7969	7.8508	23.7969	220.99%
1998	4.3908	2.2187	7.6846	2.0460	7.4136	255.21%
1997	2.2105	1.6802	3.0556	1.6742	2.0871	21.78%
1996	1.2182	1.1698	1.7361	0.9442	1.7138	50.27%
1995	1.5034	1.0653	2.2334	0.9578	1.1405	5.45%
Sector	Industry		Market Cap		Revenue	
Computer and Technology	Wireless Equipment Manufacturers		\$26.718B		\$20.800B	



- Nokia's stock price saw a massive surge in the late 1990s, particularly **1998 (+255.21%)** and **1999 (+220.99%)**, peaking around 2000.
- After a **crash in 2000 (-8.63%)** and **2001 (-43.03%)**, there was a sharp decline that continued into the early 2000s.
- The stocks experienced another uptrend around 2007-2008, but this was followed **by a major decline after 2008 (-58.26%)**, likely linked to the global financial crisis.
- Since 2010, the stock has remained relatively stable, fluctuating in a much lower price range.
- The most recent **major gain was in 2013 (+105.31%)**, likely due to strategic business moves such as selling its mobile business to Microsoft.
- Nokia's **market cap is \$26.718 billion**, and its **revenue is \$20.8 billion**.
- Nokia's stock has never fully recovered from the **dot-com bubble burst (2001)** and **2008 crash**.

# LOGITECH

Enter stock ticker symbol: LOGI						
Logitech S.A Historical Annual Stock Price Data						
Year	Average Stock Price	Year Open	Year High	Year Low	Year Close	Annual % Change
2025	95.3023	81.6400	105.0600	81.6400	90.4400	9.82%
2024	86.9176	92.3741	100.7995	76.2730	82.3500	-12.19%
2023	65.1407	60.9384	93.7849	50.1400	93.7849	55.29%
2022	58.6980	80.9281	81.6118	41.9904	60.3951	-22.88%
2021	97.4528	92.6507	130.5032	73.6453	78.3169	-14.36%
2020	59.6204	44.3538	91.5498	31.5324	91.4463	108.40%
2019	36.3235	28.5350	43.9258	26.7247	43.8793	53.43%
2018	36.4596	30.3786	44.9686	26.7978	28.5990	-5.66%
2017	30.0289	22.0465	36.0945	22.0465	30.3155	38.17%
2016	16.2965	12.7970	22.3388	11.6320	21.9402	68.72%
2015	12.0893	11.0531	13.5736	10.3882	13.0041	16.51%
2014	11.4409	10.8876	13.7502	9.3870	11.1611	-0.03%
2013	6.4694	6.0014	11.1649	4.9615	11.1649	86.53%
2012	6.4664	5.9770	8.1683	5.2417	5.9856	5.68%
2011	9.0041	13.5556	14.5384	5.2490	5.6640	-58.06%
2010	12.1777	12.9732	15.9362	9.7263	13.5047	8.42%
2009	10.5859	11.6992	13.9415	5.5620	12.4563	9.82%
2008	17.7356	26.3323	26.3541	8.1319	11.3425	-57.48%
2007	21.0736	20.9887	26.9875	18.4624	26.6744	28.11%
2006	16.0901	17.8109	22.2481	12.5000	20.8212	22.30%
2005	12.9072	10.9657	17.6471	9.9119	17.0246	54.05%
2004	8.7972	7.8171	11.1368	7.6442	11.0513	42.77%
2003	6.3921	5.6166	8.1993	5.0888	7.7406	39.40%
2002	7.0431	6.7469	9.6917	3.9768	5.5529	-15.48%
2001	5.2359	4.3444	7.1327	3.2979	6.5703	48.86%
2000	5.4207	2.4998	7.0071	2.4998	4.4136	75.98%
1999	1.4684	1.0811	2.7983	1.0238	2.5080	142.18%
1998	1.2064	1.3878	1.5243	0.7735	1.0356	-24.13%
Sector		Industry		Market Cap		Revenue
Computer and Technology		Computer - Peripherals		\$16.349B		\$4.298B



- Some years show **exceptional gains (2000, 2020, 2023)**, while others have **sharp declines (2008, 2011, 2022)**.
- The average stock price has shown a significant **long-term upward trend**, particularly after 2015.
- The stock price surged dramatically around 2020 (pandemic-driven demand for peripherals) but faced a sharp decline in 2022 before rebounding.
- The **sharp decline in 2022 was -22.88%** and get rebound in **2023 as a strong recovery of +55.29%**.
- Logitech's **market cap is \$16.349 billion**, and **revenue is \$4.298 billion**.

## Conclusion

The project demonstrates effective use of **Python** for financial data extraction, processing and visualization. The integration of *requests*, *BeautifulSoup* and *Bokeh*, allows for a seamless workflow from data acquisition to analysis and presentation.