

**S&P Dow Jones
Indices**

A Division of **S&P Global**

S&P QVML Multi-Factor Indices *Methodology*

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Introduction

Index Objective and Highlights

S&P 500 QVML Multi-Factor Index. The index measures the performance of stocks from the S&P 500 (the “Index Universe”) with the highest combinations of quality, value, momentum, and low volatility factors, as measured by a multi-factor score. Index constituents are weighted by the product of float-adjusted market capitalization (FMC) and a multi-factor score, subject to the constraints on single constituent and single sector weights defined in *Constituent Weightings*.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. The index measures the performance of stocks from the S&P SmallCap 600 (the “Index Universe”) after excluding those with the lowest quality, value, price-momentum, and low volatility multi-factor scores. Index constituents are FMC weighted, subject to the constraints defined in *Constituent Weightings*.

For information on the S&P 500 and S&P SmallCap 600, please refer to the S&P U.S. Indices Methodology, available at www.spglobal.com/spdji/.

Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices’ Equity Indices Policies & Practices Methodology	Equity Indices Policies & Practices
S&P Dow Jones Indices’ Index Mathematics Methodology	Index Mathematics Methodology
S&P Dow Jones Indices’ Float Adjustment Methodology	Float Adjustment Methodology
S&P Dow Jones Indices’ Global Industry Classification Standard (GICS) Methodology	GICS Methodology

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

Eligibility Criteria

Index Universe

To be eligible for consideration, a stock must be an existing member of the index universe as of the rebalancing reference date.

Index	Index Universe
S&P 500 QVML Multi-Factor Index	S&P 500
S&P SmallCap 600 QVML Top 90% Multi-Factor Index	S&P SmallCap 600

Eligibility Factor

Data Availability

- **S&P 500 QVML Multi-Factor Index.** Stocks missing any data required for the computation of one of the underlying factor scores are ineligible.
- **S&P SmallCap 600 QVML Top 90% Multi-Factor Index.** Stocks without all data required for the computation of the underlying factor scores remain eligible.

Multiple Share Classes. Each company is represented once by the Designated Listing. For more information regarding the treatment of multiple share classes, please refer to Approach B within the Multiple Share Classes section of the S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Construction

Constituent Selection

The selection of index constituents is as follows:

1. Calculate quality, value, momentum, and low volatility z-scores for each eligible stock.

S&P 500 QVML Multi-Factor Index. If the underlying earnings per share (“EPS”) or book value per share (“BVPS”) for a given stock’s return on equity (“ROE”) is negative, a quality score calculates but the stock is ineligible for index inclusion.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. If the underlying EPS or BVPS for a given stock’s ROE is negative, a quality z-score calculates, and is eligible for index inclusion.

For more information on the calculation of the quality and value z-scores, please refer to the S&P Quality Indices and S&P Enhanced Value Indices Methodologies, respectively, available at www.spglobal.com/spdji/.

For more information on the calculation of the momentum and low volatility z-scores, please refer to Appendix A and Appendix B, respectively.

2. Calculate percentile scores for each set of quality, value, momentum, and low volatility z-scores, as follows:¹

$$P_i = \frac{R_i}{N+1}$$

where:

P_i = Constituent percentile score

R_i = Constituent fractional rank

N = Number of constituents

Note that higher ranking constituents (R_i) are the constituents with stronger underlying z-scores and receive higher percentile scores.

3. Transform each set of percentile scores into a new set of z-scores (Z') using the inverse of the normal cumulative distribution function with a mean of zero and a standard deviation of 1.
4. Calculate an average multi-factor z-score ($x_{i_{MF}}$) for each constituent by taking the average of the underlying z-scores derived from the percentile scores.

$$x_{i_{MF}} = (Z'_{i_Q} + Z'_{i_V} + Z'_{i_M} + Z'_{i_{LV}})/4$$

where:

$x_{i_{MF}}$ = Constituent average multi-factor z-score

Z'_{i_Q} = Constituent quality Z-score

Z'_{i_V} = Constituent value Z-score

Z'_{i_M} = Constituent momentum Z-score

¹ Note that the quality and value z-scores used in calculating percentiles are average z-scores (i.e. non-winsorized) according to the S&P Quality Indices and S&P Enhanced Value Indices Methodologies, respectively. With respect to Momentum and Low Volatility, z-scores are not based on an average as these scores are derived from one underlying factor. The momentum Z-score and low volatility Z-score are non-winsorized.

Z'_{iLV} = Constituent low volatility Z-score

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. A company missing any of the underlying quality, value, momentum, or low volatility z-scores (Z') is assigned a corresponding single-factor z-score (Z') equal to the weighted average z-score (Z') from the companies with available single-factor z-scores (Z').

$$Z'_{Assigned} = \frac{\sum \text{Universe Weight} * Z'_{Available, \text{ for constituents with available single factor } Z'}}{\sum \text{Universe Weight, for constituents with available single factor } Z'}$$

- Calculate the multi-factor z-score Z'_{iMF} by standardizing the average multi-factor z-score x_{iMF} using the mean and standard deviation of x_{iMF} .

$$Z'_{iMF} = \frac{(x_{iMF} - \mu_{iMF})}{\sigma_{iMF}}$$

where:

Z'_{iMF} = Constituent multi-factor z-score for a given security

x_{iMF} = Constituent average multi-factor z-score for a given security

μ_{iMF} = Arithmetic mean of the constituent average multi-factor z-score, excluding any missing values

σ_{iMF} = Standard deviation of the constituent average multi-factor z-score

- Finally, calculate a multi-factor score (S_i) as follows:

If $Z'_{iMF} > 0$, $S_i = 1 + Z'_{iMF}$

If $Z'_{iMF} < 0$, $S_i = 1/(1 - Z'_{iMF})$

If $Z'_{iMF} = 0$, $S_i = 1$

- Rank eligible stocks based on the multi-factor score (S_i), selecting the highest ranked stocks, subject to a 20% selection buffer.² The number of constituents selected is as detailed below:

Index	Regional Target Stock Counts	Buffer Rank for Current Constituents
S&P 500 QVML Multi-Factor Index	100	120

or

For the below index, exclude the number of constituents with the lowest multi-factor score (S_i):

QVML Index	Exclusion Stock Count	Buffer Interval From Bottom	Buffer Interval From Top	Target Stock Count
S&P SmallCap 600 QVML Top 90% Multi-Factor Index	60	[72, 48]	[528, 552]	540

Selection Buffer

S&P 500 QVML Multi-Factor Index. Apply the selection buffer as follows:

- Automatically select all stocks ranked, by multi-factor score, within the top 80% of the target stock count.
- Select current constituents ranked within the top 120% of the target stock count.

² If two stocks have an equal multi-factor score, rank the company with the larger FMC higher for constituent selection purposes.

3. If at this point the target stock count is still not met, select the highest ranked non-constituent, iteratively, until the target constituent count is met.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. Apply the selection buffer as follows:

- Rank stocks in descending order by multi-factor scores, automatically selecting all stocks ranked outside the bottom 120% of the respective exclusion stock count.
- Select current constituents ranked outside the bottom 80% of their respective exclusion stock count.

Constituent Weightings

S&P 500 QVML Multi-Factor Index. At each rebalancing, the index weights constituents by the product of a constituent's respective FMC in the underlying index universe and multi-factor score, subject to security and sector constraints. Final weights are chosen in a way as to minimize the sum of the squared differences of capped weight and uncapped weight, divided by uncapped weight for each stock.

The final constituent weight is determined by an optimization procedure such that:

- The maximum weight of each security is the lower of 5% and 20 times its FMC weight in the underlying index universe.
- The maximum weight of any given GICS sector is 40%.
- Each stock's weight is floored at 0.05%.

Note that the capping algorithm used redistributes any excess weight to the other stocks in proportion to multi-factor weights (pre-optimization weights).

If the optimization procedure fails for a period, relax the constraints in the following order:

- the maximum weight of the security
- the maximum weight of the sector

If the optimization procedure still fails for a given rebalancing, then the maximum weight constraint is ignored.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. At each rebalancing, the index is FMC weighted.

Index Calculations

The indices calculate by means of the divisor methodology used in most S&P Dow Jones Indices equity indices.

For more information on the index calculation methodology, please refer to the Non-Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

Index Maintenance

Rebalancing

S&P 500 QVML Multi-Factor Index. The index rebalances semi-annually, effective after the close on the third Friday of June and December. The fundamental data reference dates are five weeks prior to each rebalancing date. As part of the rebalancing process, constituent stock weights are updated. Weights calculated as a result of the reference date data are implemented in the index using closing prices as of the Wednesday prior to the second Friday of June and December.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. The index rebalances quarterly, effective after the close on the third Friday of March, June, September, and December, with a reference date of the last business day of February, May, August, and November, respectively. The fundamental data reference date is five weeks prior to the rebalancing date. Weights calculated as a result of the reference date data are implemented in the indices using closing prices as of the Wednesday prior to the second Friday of March, June, September, and December.

Additions. Except for spin-offs, no additions are made to the indices between the semi-annual rebalancings.

Spin-offs. Spin-offs are ineligible to remain in the index. Spin-offs are added to the index at a zero price at the market close of the day before the ex-date and removed after at least one day of regular way trading.

Deletions. Index constituents removed from an underlying index are removed from the index simultaneously.

Corporate Actions

S&P 500 QVML Multi-Factor Index. For information on corporate action treatment, please refer to the Non-Market Capitalization Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P SmallCap 600 QVML Top 90% Multi-Factor Index. For information on corporate action treatment, please refer to the Non-Market Capitalization Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Currency of Calculation and Additional Index Return Series

The indices calculate in U.S. dollars.

WM/Refinitiv foreign exchange rates are taken daily at 4:00 PM London time and used in the calculation of the indices. These mid-market fixings are calculated by the WM Company based on Refinitiv data and appear on Refinitiv pages WMRA.

In addition to the indices detailed in this methodology, additional return series versions of the indices may be available, including, but not limited to the following: currency, currency hedged, decrement, fair value, inverse, leveraged, and risk control versions. For a list of available indices, please refer to the [S&P DJI Methodology & Regulatory Status Database](#).

For information on the index calculation, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

For the inputs necessary to calculate certain types of indices, including decrement, dynamic hedged, fair value, and risk control indices, please refer to the Parameters documents available at www.spglobal.com/spdji/.

Base Date and History Availability

The index history availability, base dates, and base values are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P 500 QVML Multi-Factor Index	08/10/2020	06/16/1995	06/16/1995	100
S&P SmallCap 600 QVML Top 90% Multi-Factor Index	05/29/2023	03/17/1995	03/17/1995	100

Index Data

Calculation Return Types

S&P Dow Jones Indices calculates multiple return types which vary based on the treatment of regular cash dividends. The classification of regular cash dividends is determined by S&P Dow Jones Indices.

- Price Return (PR) versions are calculated without adjustments for regular cash dividends.
- Gross Total Return (TR) versions reinvest regular cash dividends at the close on the ex-date without consideration for withholding taxes.
- Net Total Return (NTR) versions, if available, reinvest regular cash dividends at the close on the ex-date after the deduction of applicable withholding taxes.

In the event there are no regular cash dividends on the ex-date, the daily performance of all three indices will be identical.

For a complete list of indices available, please refer to the daily index levels file (“.SDL”).

For more information on the classification of regular versus special cash dividends as well as the tax rates used in the calculation of net return, please refer to S&P Dow Jones Indices’ Equity Indices Policies & Practices Methodology.

For more information on the calculation of return types, please refer to S&P Dow Jones Indices’ Index Mathematics Methodology.

Index Governance

Index Committee

An S&P Dow Jones Indices Index Committee maintains the indices. All committee members are full-time professional members of S&P Dow Jones Indices' staff. The Committee meets regularly. At each meeting, the Committee reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the indices to the market, companies that are being considered as candidates for addition to the indices, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Policy

Announcements

All index constituents are evaluated daily for data needed to calculate index levels and returns. All events affecting the daily index calculation are typically announced in advance via the Index Corporate Events report (.SDE), delivered daily to all clients. Any unusual treatment of a corporate action or short notice of an event may be communicated via email to clients.

For more information, please refer to the Announcements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Pro-forma Files

In addition to the corporate events file (.SDE), S&P Dow Jones Indices provides constituent pro-forma files each time the index rebalances. The pro-forma file is typically provided daily in advance of the rebalancing date and contains all constituents as well as their corresponding weights and index shares effective for the upcoming rebalancing. Since index shares are assigned based on prices prior to the rebalancing, the actual weight of each stock at the rebalancing differs from these weights due to market movements.

Please visit www.spglobal.com/spdji/ for a complete schedule of rebalancing timelines and pro-forma delivery times.

Holiday Schedule

The indices are calculated daily, throughout the calendar year, when the U.S. equity markets are open.

A complete holiday schedule for the year is available on S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/.

Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

Unexpected Exchange Closures

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Recalculation Policy

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Real-Time Calculation

Real-time, intra-day, index calculations are executed for some versions of the index, whenever the index's primary exchanges are open. Real-time indices are not restated.

For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Contact Information

For questions regarding an index, please contact: index_services@spglobal.com.

Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/, major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media.

Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to the [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index	Return Type	Bloomberg	RIC
S&P 500 QVML Multi-Factor Index (USD)	Price Return	SPXQLMUP	.SPXQLMUP
	Total Return	SPXQLMUT	.SPXQLMUT
	Net Total Return	SPXQLMUN	.SPXQLMUN
S&P SmallCap 600 QVML Top 90% Multi-Factor Index (USD)	Price Return	SPSQLMUP	.SPSQLMUP
	Total Return	SPSQLMUT	.SPSQLMUT
	Net Total Return	SPSQLMUN	.SPSQLMUN

Index Data

Daily constituent and index level data are available via subscription.

For product information, please contact S&P Dow Jones Indices, www.spglobal.com/spdji/en/contact-us.

Web Site

For further information, please refer to S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/.

Appendix A

Momentum Z-Score Calculation

1. **Momentum Value Calculation.** Momentum value is calculated for each of the securities in the index universe on each of the rebalancing reference dates. The momentum value is computed as the 12-month price change, excluding the most recent month of the security in local currency. If 12 months of price history is not available, momentum value is calculated from nine months of price history. The effective rebalancing month is stated as month (M).

- a. Momentum Value = $\left(\frac{\text{price}_{M-2}}{\text{price}_{M-14}} \right) - 1$

or,

- b. Momentum Value = $\left(\frac{\text{price}_{M-2}}{\text{price}_{M-11}} \right) - 1$ if 12 months of price history is not available.

2. **Momentum Z-Score Computation.** Computing a z-score is a widely adopted method of standardizing a variable. The z-score for each security is calculated using the mean and standard deviation of the relevant variable within each of the index universes. The momentum z-score is calculated as follows:

$$Z_{i_M} = \frac{(x_{i_M} - \mu_M)}{\sigma_M}$$

where:

Z_{i_M} = Momentum Z-score for a given security i

x_{i_M} = Observed momentum value for a given security i

μ_M = Arithmetic mean of the variable in a given index universe, excluding any missing values

σ_M = Standard deviation of the variable in a given index universe

Appendix B

Low Volatility Z-Score Calculation

1. **Volatility Value Calculation.** Volatility is defined as the standard deviation of the security's daily price returns, in local currency, over the prior one year of trading days. It can be mathematically expressed as:

$$\sqrt{\frac{\sum_{t=1}^N (X_t - \bar{X})^2}{N - 1}}$$

where:

X_t = Price change = $P_t/P_{t-1} - 1$

P_t = Closing price of the stock on day t

P_{t-1} = Closing price of the stock on day $t - 1$

t = 1 to N

\bar{X} = Average price change

N = Number of trading days in a year based on local calendar

2. **Low Volatility Z-Score Computation.** The low volatility z-score for each security is calculated based on the inverse of its volatility as follows:

$$Z_{i_{LV}} = \frac{(x_{i_{LV}} - \mu_{LV})}{\sigma_{LV}}$$

where:

$Z_{i_{LV}}$ = Low Volatility Z-score for a given security i

$x_{i_{LV}}$ = $\frac{1}{Volatility_i}$ for a given security i

μ_{LV} = Arithmetic mean of $\frac{1}{Volatility_i}$ in a given index universe, excluding any missing values

σ_{LV} = Standard deviation of $\frac{1}{Volatility_i}$ in a given index universe

Appendix C

Methodology Changes

Methodology changes since August 10, 2020, are as follows:

Change	Effective Date (After Close)	Previous	Methodology Updated
Constituent Selection: Step 1	12/16/2022	The selection of index constituents is as follows: 1. Calculate quality, value, momentum, and low volatility z-scores for each eligible stock.	The selection of index constituents is as follows: 1. Calculate quality, value, momentum, and low volatility z-scores for each eligible stock. S&P 500 QVML Multi-Factor Index. If the underlying earnings per share ("EPS") or book value per share ("BVPS") for a given stock's return on equity ("ROE") is negative, a quality score calculates but the stock is ineligible for index inclusion. S&P SmallCap 600 QVML Top 90% Multi-Factor Index. If the underlying EPS or BVPS for a given stock's ROE is negative, a quality z-score calculates, and is eligible for index inclusion.

Disclaimer

Performance Disclosure/Back-Tested Data

Where applicable, S&P Dow Jones Indices and its index-related affiliates (“S&P DJI”) defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P DJI defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index’s launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate certain ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using “Backward Data Assumption” (or pulling back) of ESG data for the calculation of back-tested historical performance. “Backward Data Assumption” is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as “product involvement”) were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on “Backward Data Assumption” please refer to the FAQ. The methodology and factsheets of any index that employs backward assumption in the back-tested history will explicitly state so. The methodology will include an Appendix with a table setting forth the specific

data points and relevant time period for which backward projected data was used. Index returns shown do not represent the results of actual trading of investable assets/securities. S&P DJI maintains the index and calculates the index levels and performance shown or discussed but does not manage any assets.

Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

Intellectual Property Notices/Disclaimer

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