

Financial Derivatives Logical Model

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What Are Financial Derivatives?

Financial derivatives are specialized financial contracts whose value is derived from the performance, price movement, interest rate, exchange rate, credit quality, or market behavior of another underlying asset or financial benchmark. Rather than representing direct ownership of an asset itself, derivatives are agreements between two or more parties that define how cash flows, obligations, profits, or losses will be exchanged based upon changes in market conditions.

Derivatives are widely used throughout global financial markets by banks, hedge funds, pension funds, insurance companies, commodity traders, corporations, governments, and institutional investors. These instruments serve multiple purposes including risk management, speculation, hedging, arbitrage, portfolio optimization, and liquidity management.

The “underlying asset” connected to a derivative may include:

- Stocks and equities
- Bonds and fixed income instruments
- Interest rates
- Foreign exchange currencies
- Commodities such as oil, gold, wheat, or natural gas
- Stock indexes
- Credit instruments
- Inflation indexes
- Cryptocurrencies
- Weather or energy indexes

Because derivatives derive their value from another financial variable, they can be structured in many different ways to achieve highly specific financial objectives.

Financial derivatives primarily exist to transfer or manage financial risk.

For example:

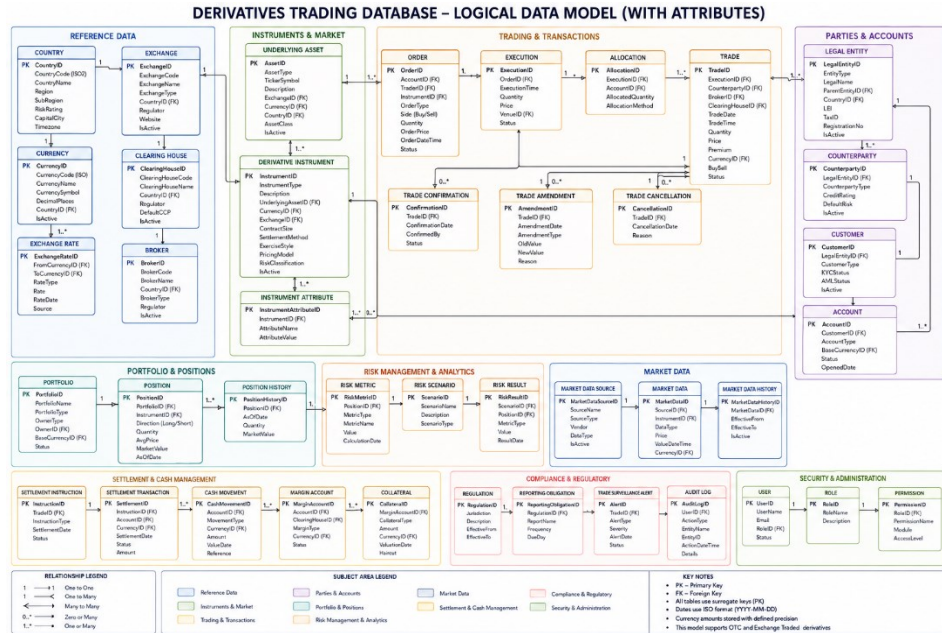
- An airline company may use fuel derivatives to stabilize future fuel costs.
- A pension fund may use interest rate swaps to manage exposure to changing interest rates.
- An exporter may use foreign exchange forwards to lock in currency conversion rates.
- A hedge fund may purchase options to speculate on future market direction.
- A bank may use credit default swaps to reduce exposure to borrower default risk.

In each case, derivatives provide a contractual mechanism for transferring uncertainty and financial exposure between parties.

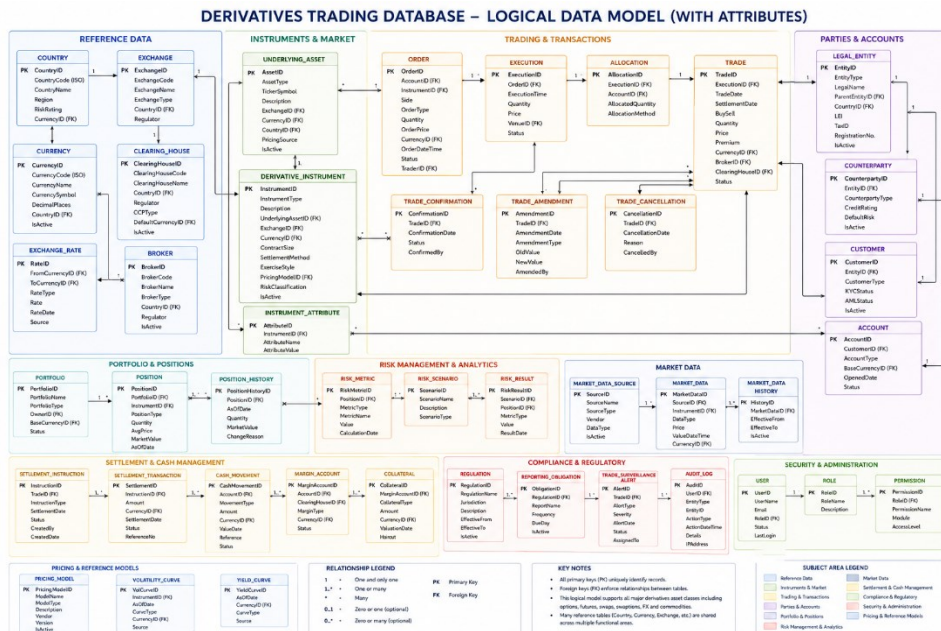
Logical Models

Here are two versions of the logical data model for the derivatives trading database.

Logical Model 1



Logical Model 2



Entity Attribute Data Dictionary

Entity	Attribute	Data Type	Key / Role	Description
Country	CountryID	INT	PK	Unique country identifier.
Country	CountryCode	CHAR(2)	AK	ISO-style country code.
Country	CountryName	NVARCHAR(100)		Country name.
Country	RegionName	NVARCHAR(100)		Geographic or business region.
Country	RiskRating	NVARCHAR(30)		Country risk classification.
Country	TimeZoneName	NVARCHAR(100)		Primary time zone reference.
Country	IsActive	BIT		Indicates active reference record.
Currency	CurrencyID	INT	PK	Unique currency identifier.
Currency	CurrencyCode	CHAR(3)	AK	Currency code such as USD or EUR.
Currency	CurrencyName	NVARCHAR(100)		Currency name.
Currency	CurrencySymbol	NVARCHAR(10)		Currency display symbol.
Currency	DecimalPlaces	TINYINT		Number of decimal places used.
Currency	CountryID	INT	FK	Related country.
Currency	IsActive	BIT		Indicates active currency.
Exchange	ExchangeID	INT	PK	Unique exchange identifier.
Exchange	ExchangeCode	NVARCHAR(20)	AK	Exchange code.
Exchange	ExchangeName	NVARCHAR(150)		Exchange name.
Exchange	ExchangeType	NVARCHAR(50)		Equity, derivatives, commodity, FX, etc.
Exchange	CountryID	INT	FK	Exchange country.
Exchange	RegulatorName	NVARCHAR(150)		Primary regulator.
Exchange	WebsiteURL	NVARCHAR(255)		Optional website reference.
Exchange	IsActive	BIT		Indicates active exchange.
Clearing House	ClearingHouseID	INT	PK	Unique clearing house identifier.
Clearing House	ClearingHouseCode	NVARCHAR(20)	AK	Clearing house code.

Entity	Attribute	Data Type	Key / Role	Description
Clearing House	ClearingHouseName	NVARCHAR(150)		Clearing organization name.
Clearing House	CountryID	INT	FK	Jurisdiction country.
Clearing House	DefaultCurrencyID	INT	FK	Default clearing currency.
Clearing House	RegulatorName	NVARCHAR(150)		Clearing regulator.
Clearing House	IsCentralCounterparty	BIT		Indicates CCP status.
Clearing House	IsActive	BIT		Indicates active record.
Exchange Rate	ExchangeRateID	BIGINT	PK	Unique exchange rate identifier.
Exchange Rate	FromCurrencyID	INT	FK	Source currency.
Exchange Rate	ToCurrencyID	INT	FK	Target currency.
Exchange Rate	RateType	NVARCHAR(30)		Spot, forward, official, or closing rate.
Exchange Rate	RateDate	DATE		Effective date of rate.
Exchange Rate	ExchangeRate	DECIMAL(28,10)		Conversion rate.
Exchange Rate	SourceName	NVARCHAR(100)		Rate source.
Legal Entity	LegalEntityID	BIGINT	PK	Unique legal entity identifier.
Legal Entity	EntityType	NVARCHAR(50)		Customer, bank, broker, fund, regulator, etc.
Legal Entity	LegalName	NVARCHAR(200)		Registered legal name.
Legal Entity	ParentEntityID	BIGINT	FK	Parent legal entity, if applicable.
Legal Entity	CountryID	INT	FK	Country of registration.
Legal Entity	LEI	NVARCHAR(30)		Legal entity identifier.
Legal Entity	TaxID	NVARCHAR(50)		Tax identification value.
Legal Entity	RegistrationNo	NVARCHAR(50)		Registration number.
Legal Entity	IsActive	BIT		Indicates active legal entity.
Customer	CustomerID	BIGINT	PK	Unique customer identifier.
Customer	LegalEntityID	BIGINT	FK	Related legal entity.
Customer	CustomerType	NVARCHAR(50)		Institutional, individual, hedge fund, etc.
Customer	KYCStatus	NVARCHAR(30)		Know Your Customer status.

Entity	Attribute	Data Type	Key / Role	Description
Customer	AMLStatus	NVARCHAR(30)		Anti-money-laundering status.
Customer	RiskCategory	NVARCHAR(30)		Customer risk category.
Customer	OpenedDate	DATE		Customer onboarding date.
Customer	IsActive	BIT		Indicates active customer.
Counterparty	CounterpartyID	BIGINT	PK	Unique counterparty identifier.
Counterparty	LegalEntityID	BIGINT	FK	Related legal entity.
Counterparty	CounterpartyType	NVARCHAR(50)		Dealer, bank, fund, clearing member, etc.
Counterparty	CreditRating	NVARCHAR(30)		Credit rating.
Counterparty	DefaultRiskRating	NVARCHAR(30)		Internal default risk rating.
Counterparty	IsActive	BIT		Indicates active counterparty.
Broker	BrokerID	BIGINT	PK	Unique broker identifier.
Broker	BrokerCode	NVARCHAR(30)	AK	Broker code.
Broker	BrokerName	NVARCHAR(150)		Broker name.
Broker	BrokerType	NVARCHAR(50)		Prime, executing, introducing, clearing broker.
Broker	CountryID	INT	FK	Broker country.
Broker	RegulatorName	NVARCHAR(150)		Broker regulator.
Broker	IsActive	BIT		Indicates active broker.
Account	AccountID	BIGINT	PK	Unique account identifier.
Account	CustomerID	BIGINT	FK	Owning customer.
Account	AccountNumber	NVARCHAR(50)	AK	Business account number.
Account	AccountType	NVARCHAR(50)		Trading, custody, margin, cash, etc.
Account	BaseCurrencyID	INT	FK	Account base currency.
Account	AccountStatus	NVARCHAR(30)		Open, closed, restricted, suspended.
Account	OpenedDate	DATE		Account opening date.
Underlying Asset	AssetID	BIGINT	PK	Unique underlying asset identifier.

Entity	Attribute	Data Type	Key / Role	Description
Underlying Asset	AssetType	NVARCHAR(50)		Equity, index, rate, commodity, FX pair, etc.
Underlying Asset	TickerSymbol	NVARCHAR(50)		Market symbol or reference code.
Underlying Asset	AssetName	NVARCHAR(200)		Underlying asset name.
Underlying Asset	ExchangeID	INT	FK	Listing exchange, if applicable.
Underlying Asset	CurrencyID	INT	FK	Pricing currency.
Underlying Asset	CountryID	INT	FK	Country association.
Underlying Asset	PricingSource	NVARCHAR(100)		Source used for valuation.
Underlying Asset	AssetClass	NVARCHAR(50)		Asset class grouping.
Underlying Asset	IsActive	BIT		Indicates active asset.
Derivative Instrument	InstrumentID	BIGINT	PK	Unique instrument identifier.
Derivative Instrument	InstrumentCode	NVARCHAR(50)	AK	Business instrument code.
Derivative Instrument	InstrumentType	NVARCHAR(50)		Option, swap, swaption, future, forward, etc.
Derivative Instrument	InstrumentName	NVARCHAR(200)		Descriptive instrument name.
Derivative Instrument	UnderlyingAssetID	BIGINT	FK	Related underlying asset.
Derivative Instrument	ExchangeID	INT	FK	Exchange, if exchange-traded.
Derivative Instrument	CurrencyID	INT	FK	Trading or settlement currency.
Derivative Instrument	ContractSize	DECIMAL(28,8)		Contract multiplier or notional unit size.
Derivative Instrument	StrikePrice	DECIMAL(28,8)		Option strike or agreed price.
Derivative Instrument	ExpirationDate	DATE		Contract expiration date.
Derivative Instrument	SettlementMethod	NVARCHAR(50)		Cash, physical, net, or bilateral.
Derivative Instrument	ExerciseStyle	NVARCHAR(50)		American, European, Bermudan, etc.
Derivative Instrument	PricingModelName	NVARCHAR(100)		Pricing model reference.

Entity	Attribute	Data Type	Key / Role	Description
Derivative Instrument	RiskClassification	NVARCHAR(50)		Internal risk category.
Derivative Instrument	IsOTC	BIT		Indicates over-the-counter instrument.
Derivative Instrument	IsActive	BIT		Indicates active instrument.
Instrument Attribute	InstrumentAttributeID	BIGINT	PK	Unique attribute identifier.
Instrument Attribute	InstrumentID	BIGINT	FK	Related derivative instrument.
Instrument Attribute	AttributeName	NVARCHAR(100)		Flexible attribute name.
Instrument Attribute	AttributeValue	NVARCHAR(4000)		Flexible attribute value.
Trade Order	OrderID	BIGINT	PK	Unique order identifier.
Trade Order	AccountID	BIGINT	FK	Account placing the order.
Trade Order	TraderUserID	BIGINT	FK	User entering the order.
Trade Order	InstrumentID	BIGINT	FK	Requested instrument.
Trade Order	OrderType	NVARCHAR(50)		Market, limit, RFQ, stop, etc.
Trade Order	Side	NVARCHAR(10)		BUY or SELL.
Trade Order	Quantity	DECIMAL(28,8)		Ordered quantity.
Trade Order	OrderPrice	DECIMAL(28,8)		Limit or requested price.
Trade Order	CurrencyID	INT	FK	Order currency.
Trade Order	OrderDateTime	DATETIME2(3)		Order timestamp.
Trade Order	OrderStatus	NVARCHAR(30)		New, filled, cancelled, rejected, etc.
Execution	ExecutionID	BIGINT	PK	Unique execution identifier.
Execution	OrderID	BIGINT	FK	Related order.
Execution	ExecutionTime	DATETIME2(3)		Execution timestamp.
Execution	Quantity	DECIMAL(28,8)		Executed quantity.
Execution	Price	DECIMAL(28,8)		Execution price.
Execution	VenueID	INT	FK	Execution venue.
Execution	ExecutionStatus	NVARCHAR(30)		Executed, partial, rejected, etc.
Trade	TradeID	BIGINT	PK	Unique booked trade identifier.

Entity	Attribute	Data Type	Key / Role	Description
Trade	ExecutionID	BIGINT	FK	Source execution.
Trade	AccountID	BIGINT	FK	Account booked to trade.
Trade	CounterpartyID	BIGINT	FK	Opposing counterparty.
Trade	BrokerID	BIGINT	FK	Broker used for trade.
Trade	ClearingHouseID	INT	FK	Clearing organization.
Trade	InstrumentID	BIGINT	FK	Traded derivative instrument.
Trade	TradeDate	DATE		Trade date.
Trade	TradeTime	TIME(3)		Trade time.
Trade	SettlementDate	DATE		Expected settlement date.
Trade	BuySell	NVARCHAR(10)		BUY or SELL.
Trade	Quantity	DECIMAL(28,8)		Trade quantity.
Trade	Price	DECIMAL(28,8)		Trade price.
Trade	Premium	DECIMAL(28,8)		Option premium or trade premium.
Trade	CurrencyID	INT	FK	Trade currency.
Trade	TradeStatus	NVARCHAR(30)		Booked, amended, cancelled, settled, etc.
Allocation	AllocationID	BIGINT	PK	Unique allocation identifier.
Allocation	ExecutionID	BIGINT	FK	Source execution.
Allocation	AccountID	BIGINT	FK	Receiving account.
Allocation	AllocatedQuantity	DECIMAL(28,8)		Quantity allocated to account.
Allocation	AllocationMethod	NVARCHAR(50)		Full, pro-rata, manual, strategy-based.
Trade Confirmation	ConfirmationID	BIGINT	PK	Unique confirmation identifier.
Trade Confirmation	TradeID	BIGINT	FK	Related trade.
Trade Confirmation	ConfirmationDate	DATETIME2(3)		Confirmation timestamp.
Trade Confirmation	ConfirmedBy	NVARCHAR(100)		User or party confirming trade.
Trade Confirmation	ConfirmationStatus	NVARCHAR(30)		Confirmed, pending, disputed.
Trade Amendment	AmendmentID	BIGINT	PK	Unique amendment identifier.

Entity	Attribute	Data Type	Key / Role	Description
Trade Amendment	TradeID	BIGINT FK		Related trade.
Trade Amendment	AmendmentDate	DATETIME2(3)		Amendment timestamp.
Trade Amendment	AmendmentType	NVARCHAR(50)		Type of trade change.
Trade Amendment	OldValue	NVARCHAR(4000)		Previous value.
Trade Amendment	NewValue	NVARCHAR(4000)		Revised value.
Trade Amendment	Reason	NVARCHAR(500)		Reason for amendment.
Trade Amendment	AmendedBy	NVARCHAR(100)		User making amendment.
Trade Cancellation	CancellationID	BIGINT PK		Unique cancellation identifier.
Trade Cancellation	TradeID	BIGINT FK		Cancelled trade.
Trade Cancellation	CancellationDate	DATETIME2(3)		Cancellation timestamp.
Trade Cancellation	Reason	NVARCHAR(500)		Cancellation reason.
Trade Cancellation	CancelledBy	NVARCHAR(100)		User cancelling trade.
Portfolio	PortfolioID	BIGINT PK		Unique portfolio identifier.
Portfolio	PortfolioName	NVARCHAR(150)		Portfolio name.
Portfolio	PortfolioType	NVARCHAR(50)		Trading book, risk book, fund, desk, strategy.
Portfolio	AccountID	BIGINT FK		Related account.
Portfolio	OwnerLegalEntityID	BIGINT FK		Owning legal entity.
Portfolio	BaseCurrencyID	INT FK		Reporting currency.
Portfolio	Status	NVARCHAR(30)		Active, closed, suspended.
Position	PositionID	BIGINT PK		Unique position identifier.
Position	PortfolioID	BIGINT FK		Related portfolio.
Position	InstrumentID	BIGINT FK		Held instrument.
Position	PositionType	NVARCHAR(20)		LONG or SHORT.

Entity	Attribute	Data Type	Key / Role	Description
Position	Quantity	DECIMAL(28,8)		Current position quantity.
Position	AveragePrice	DECIMAL(28,8)		Average cost or entry price.
Position	MarketValue	DECIMAL(28,8)		Current market value.
Position	AsOfDate	DATE		Position valuation date.
Position History	PositionHistoryID	BIGINT	PK	Unique position history identifier.
Position History	PositionID	BIGINT	FK	Related position.
Position History	AsOfDate	DATE		Historical snapshot date.
Position History	Quantity	DECIMAL(28,8)		Historical quantity.
Position History	MarketValue	DECIMAL(28,8)		Historical market value.
Position History	ChangeReason	NVARCHAR(200)		Reason for historical change.
Market Data Source	SourceID	INT	PK	Unique source identifier.
Market Data Source	SourceName	NVARCHAR(150)	AK	Source name.
Market Data Source	SourceType	NVARCHAR(50)		Exchange, vendor, internal model, OTC feed.
Market Data Source	VendorName	NVARCHAR(150)		Vendor or provider name.
Market Data Source	DataType	NVARCHAR(50)		Price, rate, curve, volatility, index.
Market Data Source	IsActive	BIT		Indicates active source.
Market Data	MarketDataID	BIGINT	PK	Unique market data identifier.
Market Data	SourceID	INT	FK	Data source.
Market Data	InstrumentID	BIGINT	FK	Related derivative instrument.
Market Data	AssetID	BIGINT	FK	Related underlying asset.
Market Data	DataType	NVARCHAR(50)		Price, yield, volatility, curve point.
Market Data	Price	DECIMAL(28,8)		Market price value.
Market Data	YieldRate	DECIMAL(18,10)		Yield or interest rate value.
Market Data	Volatility	DECIMAL(18,10)		Volatility value.
Market Data	ValueDateTime	DATETIME2(3)		Market data timestamp.

Entity	Attribute	Data Type	Key / Role	Description
Market Data	CurrencyID	INT	FK	Market data currency.
Market Data History	HistoryID	BIGINT	PK	Unique history identifier.
Market Data History	MarketDataID	BIGINT	FK	Related market data record.
Market Data History	EffectiveFrom	DATETIME2(3)		Start of effective period.
Market Data History	EffectiveTo	DATETIME2(3)		End of effective period.
Market Data History	IsActive	BIT		Indicates current historical version.
Risk Scenario	ScenarioID	BIGINT	PK	Unique scenario identifier.
Risk Scenario	ScenarioName	NVARCHAR(150)		Scenario name.
Risk Scenario	Description	NVARCHAR(1000)		Scenario description.
Risk Scenario	ScenarioType	NVARCHAR(50)		Base, stress, shock, historical, hypothetical.
Risk Metric	RiskMetricID	BIGINT	PK	Unique risk metric identifier.
Risk Metric	PositionID	BIGINT	FK	Related position.
Risk Metric	InstrumentID	BIGINT	FK	Related instrument.
Risk Metric	MetricType	NVARCHAR(50)		Greek, exposure, VaR, sensitivity.
Risk Metric	MetricName	NVARCHAR(100)		Delta, gamma, theta, vega, rho, etc.
Risk Metric	MetricValue	DECIMAL(28,10)		Calculated metric value.
Risk Metric	CalculationDate	DATETIME2(3)		Calculation timestamp.
Risk Result	RiskResultID	BIGINT	PK	Unique risk result identifier.
Risk Result	ScenarioID	BIGINT	FK	Related risk scenario.
Risk Result	PositionID	BIGINT	FK	Related position.
Risk Result	InstrumentID	BIGINT	FK	Related instrument.
Risk Result	MetricType	NVARCHAR(50)		Scenario P&L, exposure, loss, shock result.
Risk Result	MetricValue	DECIMAL(28,10)		Result value.
Risk Result	ResultDate	DATETIME2(3)		Result timestamp.
Settlement Instruction	InstructionID	BIGINT	PK	Unique settlement instruction identifier.

Entity	Attribute	Data Type	Key / Role	Description
Settlement Instruction	TradeID	BIGINT	FK	Related trade.
Settlement Instruction	InstructionType	NVARCHAR(50)		Cash, physical, net, margin, delivery.
Settlement Instruction	SettlementDate	DATE		Settlement date.
Settlement Instruction	Status	NVARCHAR(30)		Pending, released, settled, failed.
Settlement Instruction	CreatedBy	NVARCHAR(100)		User creating instruction.
Settlement Instruction	CreatedDate	DATETIME2(3)		Creation timestamp.
Settlement Transaction	SettlementID	BIGINT	PK	Unique settlement transaction identifier.
Settlement Transaction	InstructionID	BIGINT	FK	Related settlement instruction.
Settlement Transaction	AccountID	BIGINT	FK	Account receiving settlement.
Settlement Transaction	Amount	DECIMAL(28,8)		Settlement amount.
Settlement Transaction	CurrencyID	INT	FK	Settlement currency.
Settlement Transaction	SettlementDate	DATE		Settlement date.
Settlement Transaction	SettlementStatus	NVARCHAR(30)		Pending, settled, failed.
Settlement Transaction	ReferenceNo	NVARCHAR(100)		External or internal reference number.
Cash Movement	CashMovementID	BIGINT	PK	Unique cash movement identifier.
Cash Movement	AccountID	BIGINT	FK	Related account.
Cash Movement	MovementType	NVARCHAR(50)		Deposit, withdrawal, settlement, fee, margin.
Cash Movement	Amount	DECIMAL(28,8)		Cash amount.
Cash Movement	CurrencyID	INT	FK	Cash currency.
Cash Movement	ValueDate	DATE		Value date.
Cash Movement	ReferenceNo	NVARCHAR(100)		Transaction reference.
Cash Movement	Status	NVARCHAR(30)		Pending, posted, reversed.

Entity	Attribute	Data Type	Key / Role	Description
Margin Account	MarginAccountID	BIGINT	PK	Unique margin account identifier.
Margin Account	AccountID	BIGINT	FK	Related trading account.
Margin Account	ClearingHouseID	INT	FK	Clearing house, if applicable.
Margin Account	MarginType	NVARCHAR(50)		Initial, variation, independent, OTC collateral.
Margin Account	CurrencyID	INT	FK	Margin currency.
Margin Account	MarginBalance	DECIMAL(28,8)		Current margin balance.
Margin Account	Status	NVARCHAR(30)		Open, closed, restricted.
Collateral	CollateralID	BIGINT	PK	Unique collateral identifier.
Collateral	MarginAccountID	BIGINT	FK	Related margin account.
Collateral	CollateralType	NVARCHAR(50)		Cash, bond, treasury, letter of credit, security.
Collateral	Amount	DECIMAL(28,8)		Collateral amount.
Collateral	CurrencyID	INT	FK	Collateral currency.
Collateral	ValuationDate	DATE		Collateral valuation date.
Collateral	HaircutPercent	DECIMAL(9,6)		Discount applied for collateral risk.
Regulation	RegulationID	INT	PK	Unique regulation identifier.
Regulation	RegulationName	NVARCHAR(150)		Regulation name.
Regulation	Jurisdiction	NVARCHAR(100)		Applicable jurisdiction.
Regulation	Description	NVARCHAR(1000)		Regulation description.
Regulation	EffectiveFrom	DATE		Effective start date.
Regulation	EffectiveTo	DATE		Effective end date.
Regulation	IsActive	BIT		Indicates active regulation.
Reporting Obligation	ObligationID	BIGINT	PK	Unique reporting obligation identifier.
Reporting Obligation	RegulationID	INT	FK	Related regulation.
Reporting Obligation	ReportName	NVARCHAR(150)		Required report name.
Reporting Obligation	Frequency	NVARCHAR(50)		Daily, monthly, quarterly, annual.

Entity	Attribute	Data Type	Key / Role	Description
Reporting Obligation	DueDay	NVARCHAR(50)		Due timing, such as T+1.
Reporting Obligation	IsActive	BIT		Indicates active obligation.
Trade Surveillance Alert	AlertID	BIGINT PK		Unique alert identifier.
Trade Surveillance Alert	TradeID	BIGINT FK		Related trade.
Trade Surveillance Alert	AlertType	NVARCHAR(100)		Alert category.
Trade Surveillance Alert	Severity	NVARCHAR(30)		Low, medium, high, critical.
Trade Surveillance Alert	AlertDate	DATETIME2(3)		Alert timestamp.
Trade Surveillance Alert	Status	NVARCHAR(30)		Open, reviewed, escalated, closed.
Trade Surveillance Alert	AssignedTo	NVARCHAR(100)		Assigned compliance reviewer.
Audit Log	AuditLogID	BIGINT PK		Unique audit log identifier.
Audit Log	UserName	NVARCHAR(100)		User performing action.
Audit Log	EntityType	NVARCHAR(100)		Entity affected.
Audit Log	EntityID	BIGINT		Identifier of affected record.
Audit Log	ActionType	NVARCHAR(50)		Insert, update, delete, approve, review.
Audit Log	ActionDateTime	DATETIME2(3)		Audit timestamp.
Audit Log	Details	NVARCHAR(4000)		Audit details.
Audit Log	IPAddress	NVARCHAR(50)		Source IP address.
Role	RoleID	INT PK		Unique role identifier.
Role	RoleName	NVARCHAR(100) AK		Role name.
Role	Description	NVARCHAR(500)		Role description.

Entity	Attribute	Data Type	Key / Role	Description
App User	UserID	BIGINT	PK	Unique application user identifier.
App User	UserName	NVARCHAR(100)	AK	Login or user name.
App User	EmailAddress	NVARCHAR(255)	AK	User email address.
App User	RoleID	INT	FK	Assigned role.
App User	UserStatus	NVARCHAR(30)		Active, inactive, locked, suspended.
App User	LastLoginDate	DATETIME2(3)		Last login timestamp.
Permission	PermissionID	INT	PK	Unique permission identifier.
Permission	RoleID	INT	FK	Related role.
Permission	PermissionName	NVARCHAR(100)		Permission name.
Permission	ModuleName	NVARCHAR(100)		Application module.
Permission	AccessLevel	NVARCHAR(30)		Read, write, approve, admin.

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