



Accessing and Creating Tables

Getting Tables

```
db.t("Namespace", "Table")           //access historical data
db.i("Namespace", "Table")           //access intraday data
db.i("Namespace", "Table", isLive)    //access intraday data w/o ticking

db.getNamespaces()
db.getTableNames("Namespace")
db.getCatalog() //get a table with available namespaces and table names
```

Filtering Data

Note: Backticks (`) are used for strings within strings.

where

```
t.where("Condition"...)  
  //examples  
t.where("Date > `2018-01-01`")  
t.where("Timestamp <= '2018-01-01T16:00:00 NY'")  
t.where("USym = `AAPL`")  
t.where("USym in `AAPL`, `MSFT`, `GOOG`") // filters a list of values  
t.where("USym icase in `aapl`, `msft`, `goog`") //case insensitive  
t.where("USym not in `NVDA`, `AMZN`")  
  
t1.whereIn(t2, "Match"... ) //filter to rows that match  
t1.whereNotIn(t2, "Match"... ) //filter to rows that do not match  
  //examples  
t1.whereIn(t2, "USym")  
t1.whereIn(t2, "USym=UnderlyingSym") //can match different column names
```

head/tail

```
t.head(rows) //first number of rows  
t.headPct(decimalNum) //first percentage of rows  
t.headBy(rows, "Column"... ) //first number of rows for each subset  
t.tail(rows) //last number of rows  
t.tailPct(decimalNum)  
t.tailBy(rows, "Column"... )
```

Sorting Data

```
t.sort("Column"...)  
t.sortDescending("Column"...)  
t.reverse() //reverses order of entire table  
t.restrictSortTo("Column"... ) //restricts sorting to specified columns  
t.clearSortingRestrictions() //removes sorting restrictions
```

Data Selection

In-memory

```
t.select("ColumnFormula"...)  
t.update("ColumnFormula"...)
```

 //evaluates data once and stores it in memory

On-the-fly

```
t.view("ColumnFormula"...)  
t.updateView("ColumnFormula"...)
```

 //evaluates data but doesn't store results in memory

Other Methods

```
t.selectDistinct("Column"...)
```

 //only keep unique values

```
t.dropColumns("Column"...)  
t.renameColumns("ColumnRename"...)
t.moveColumns(index, "Column"...)  
t.moveUpColumns("Column"...)
```

Grouping and Aggregating Data

By and Ungroup

```
t.by("Column"...)  
    //data in columns other than those specified are grouped into arrays  
  
t.ungroup("Column"...)  
    //distributes values in specified columns into arrays  
    //each array value becomes its own row
```

ByExternal

```
tables = t.byExternal("Column"...)  
tables.getKeySet()
```

 //returns array of keys

```
table = tables.get("Key")  
  
//The following is required if the table broken down by multiple columns  
import com.fishlib.datastructures.util.SmartKey  
table = tables.get(new SmartKey("Key"...))
```

Simple Aggregations

```
t.firstBy("Column"...)  
t.lastBy("Column"...)  
t.sumBy("Column"...)  
t.avgBy("Column"...)  
t.stdBy("Column"...)  
t.varBy("Column"...)  
t.medianBy("Column"...)  
t.minBy("Column"...)  
t.maxBy("Column"...)  
t.countBy("CountColumn", "Column"...)
```

//combined aggregation example

```
t.by(AggCombo(AggSum("Dollars", "Size"), AggAvg("AvgSize=Size")), "Symbol")
```

Combined Aggregations

```
t.by(AggCombo(Agg..., "Column"...)  
  
AggFirst("Column"...)  
AggLast("Column"...)  
AggSum("Column"...)  
AggAvg("Column"...)  
AggStd("Column"...)  
AggVar("Column"...)  
AggMedian("Column"...)  
AggMin("Column"...)  
AggMax("Column"...)  
AggCount("Column")
```

Joining Data from Multiple Tables

```
t1.naturalJoin(t2, "Match...", "ColumnToAdd...")
t1.exactJoin(t2, "Match...", "ColumnToAdd...")
t1.join(t2, "Match...", "ColumnToAdd...")
t1.leftJoin(t2, "Match...", "ColumnToAdd...")

//as-of joins matching subsets need to be ordered
t1.aj(t2, "Match...", AjMatch, "ColumnToAdd...")
t1.raj(t2, "Match...", AjMatch, "ColumnToAdd...")
```

Working with Time

Note: Single quotes (') rather than backticks (`) are used within strings.

String Formats

```
yyyy-mm-ddThh:mm:ss.nanos TZ //date-time
#y#m#w#dT#h#m#s           //period
hh:mm:ss.nanos           //duration

//constants representing nanoseconds
threeSeconds = 3 * SECOND
fiveMinutes = 5 * MINUTE
twoHours = 2 * HOUR
sevenDays = 7 * DAY
```

Useful Methods

```
currentDateNy()
lastBusinessDateNy()
formatDateNy(DateTime) //converts to a date string
currentTime()
```

Formatting Tables

Numeric

```
t.formatColumns("ColumnName=Decimal(`.00#`)"...)
//or Decimal(`$.00#`) or Decimal(`0.00#`)
//# means only display non-zero numbers in position
//0 means display zeroes in position
```

Color

```
t.formatColumns("ColumnName=Color")
t.formatColumnsWhere("ColumnName", "Condition", "Color")
t.formatRowWhere("Condition", "Color")
t.formatColumns("ColumnName=heatmap(Column, minValue, maxValue, minColor, maxColor)")
```

Special Table Operations

Table Tools

```
emptyTable(rows)
newTable(column...) //create table with columns specified below
merge(table...) //append table rows to one another with same columns
```

Metadata

```
t.getMeta()
```