Prometheus Cheatsheet

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1 Metric vs. Time-Series

Metric is a numerical value that represents a specific measurement at a specific point in time.

Time Series is a sequence of data points, typically ordered by time, that represents the evolution of a metric over time.

- every vector & label combo is a time series.

2 Prometheus TSDB

Prometheus TSDB is a time series database designed for storing and querying time series data, particularly metrics data collected from various sources.

2.1 Head block

Head block is the in-memory storage component of Prometheus TSDB that holds the most recent time series data before it is flushed to disk.

- Each chunk for a time series in the head block typically contains data points for a specific time range and can grow to 120 samples before it is flushed to the active chunk's segment file in the `chunks_head` directory on the disk.
- Each head chunk segment file can grow to 128 MB before it is finalized and a new segment file is created for that chunk.
- When the head block reaches 1.5x the minimum block size (default 2 hours), a new block is created, and the current head block is flushed to disk as a finalized block.

2.2 WAL

WAL (Write-Ahead Log) is a log file that records all changes made to the head block before they are applied, ensuring data durability and consistency in case of crashes.

- The WAL prevents loss of recent data by allowing Prometheus to replay the log and restore the head block to its last known state upon restart.
- WAL segments are stored in the `wal` directory and are named sequentially (e.g., 00000000, 00000001, etc.).
- Each WAL segment can grow up to 512 MB before a new segment is created

3 promQL (Prometheus Query Language)

promQL is the query language used to query metrics stored in Prometheus.

PromQL queries can evaluate to one of four types of results:

- Instant vector: A set of time series containing a single sample for each time series, all sharing the same timestamp.
- Range vector: A set of time series containing a range of data points over time for each time series.
- Scalar: A single numerical value. (i.e., 177.6)
- String: A single string value. (i.e., "Primus Sux")

3.1 Selectors & Matchers

3.1.1 Selctors

- timeseries
- Range Vector Selector will returns all values for a metric over a time period

3.1.2 Label Matchers

- Label matchers allow you to return metrics for a subset of time series.

  = Exact match on a label value.

  != Negative equality matcher - return time series that do not have specified label.

  =~ Regualar Expression Matcher - utilize `regex` to match time series.

  !~ Negative Regualar Expression Matcher - return time series that do not match `regex` expression

- multiple seletors can. be used in a query by seperating them with a comma.

3.2 Modifiers

offset modifiers allows you top retrieve historc data.

@ modifier allows you to retrieve data from a specific point in time.

- **offset** and @ modifiers can be combined in a query (order does not matter).
- **Range vectors** can also be combined with **offset** and @ modifiers.

3.3 Operators

3.3.1 Arithmatic Operators

Arithmatic Operators allow users to perform basic math operations

3.3.2 Bool Operators

Bool Operators

3.3.3 Logical Operators

3.4 Vector Matching

Rules for vector matching:

1. *All labels must be identical* between vectors samples to match.

3.4.1 Vector Matching Keywords