AT A GLANCE
Wavefront distribution histograms allow users to get better insight into their high volume metrics than they would traditionally get from percentiles and averages.

KEY BENEFITS
- Capability to deal with high-scale, sub-second data points
- Scale better than similar open source solutions
- Rich set of histogram distribution functions
- Avoid false readings on key SLAs by using histogram distributions

Why Wavefront Histograms?
When it comes to reporting high-velocity metrics about your applications and infrastructure – mainly those gathered across many distributed sources – the reported performance metrics by traditional monitoring tools data may not be accurate. High-velocity metrics such as sub-second web requests and API response times are just a few examples of high-velocity data. Engineering teams can mistakenly assume that their monitoring report and process percentiles (p50, p95, and p99) but instead be unaware that they are just working with averages and medians. Reporting averages and medians hide essential information about distributions of their data sources and can create inaccurate reporting critical for their SaaS. The Wavefront histograms is an accurate solution for monitoring collected data (metrics and traces) and their distribution without compromising scale or losing valuable reporting data.

The Value
Wavefront histograms are a mechanism to compute, store, and use distributions of metrics. A Wavefront histogram is a distribution of parameters collected and calculated by the Wavefront proxy (4.12 and later) or sent to the Wavefront service via direct ingestion.

Figure 1 - Wavefront Histogram Distributions
Wavefront creates distributions by aggregating metrics into bins. The graph above illustrates a distribution of 205 points that range in value from 0 to 120 at t = 1 minute, into bins of size 10.
### Wavefront Histograms Provide:

- Reporting and alerting
- Ability to merge histograms over time or based on data point tags
- Histogram distribution functions to calculate significant values out of histogram metrics
- Percentiles generation based on histograms

The advantage of Wavefront distribution histograms compared with percentiles and averages is that they can be combined over time or based on data point tags. Example of time merge is merging 1-minute histograms into 1-hour histogram. Wavefront supports 1-day histograms, too. The merge can also be done based on the tag associated with data points.

The user can calculate any specified percentile from the merged histogram. One example of this is reporting and alerting 99th percentiles of latency metrics for external web services processing 50,000 or more events per second.

Wavefront user can apply different functions to histogram distributions to get the appropriate point of view to its data. Functions include merge, max, median and count values from histograms metrics.

When dealing with high-velocity metrics, Wavefront histograms do not store each actual data point value they have been fed. Instead, histograms store the quantiles calculated from histogram points, which are estimates within a certain margin of error.

To learn more, get started for free at the Wavefront sign-up.

### Getting Started

To read more about problems solved by histograms read Wavefront blog:

To start deep dive into histograms read Wavefront documentation:
https://docs.wavefront.com/proxies_histograms.html

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<table>
<thead>
<tr>
<th>Time (minute)</th>
<th>Distribution (number of points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[2, 1, 9, 20, 31, 40, 40, 29, 19, 10, 2, 2]</td>
</tr>
<tr>
<td>2</td>
<td>[2, 1, 9, 22, 31, 38, 41, 28, 17, 13, 3, 2]</td>
</tr>
<tr>
<td>3</td>
<td>[1, 2, 10, 21, 31, 39, 40, 29, 19, 10, 1, 2]</td>
</tr>
<tr>
<td>4</td>
<td>[2, 1, 9, 19, 29, 40, 41, 31, 20, 10, 1, 2]</td>
</tr>
</tbody>
</table>

Figure 2 - The table above lists the distribution of one metric at successive minutes. The first row of the table contains the distribution illustrated in figure 1. The following rows show how the distribution evolves over consecutive minutes.