ZABBIX 6.0 WORKSHOP WEEK

CREATING TRIGGERS FOR BASELINE MONITORING AND ANOMALY DETECTION

01

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ANOMALLY DETECTION

WHAT IS ANOMALLY DETECTION

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- Anomally detection works by going through historical data and looking for values that are out of normal
- Works if the majority of data is considered «normal»
- Long term analitics – works with trends data
- Zabbix uses STL decomposition algorithm (Seasonal and Trend decomposition using Loess)

WHAT IS STL DECOMPOSITION ALGORITHM?

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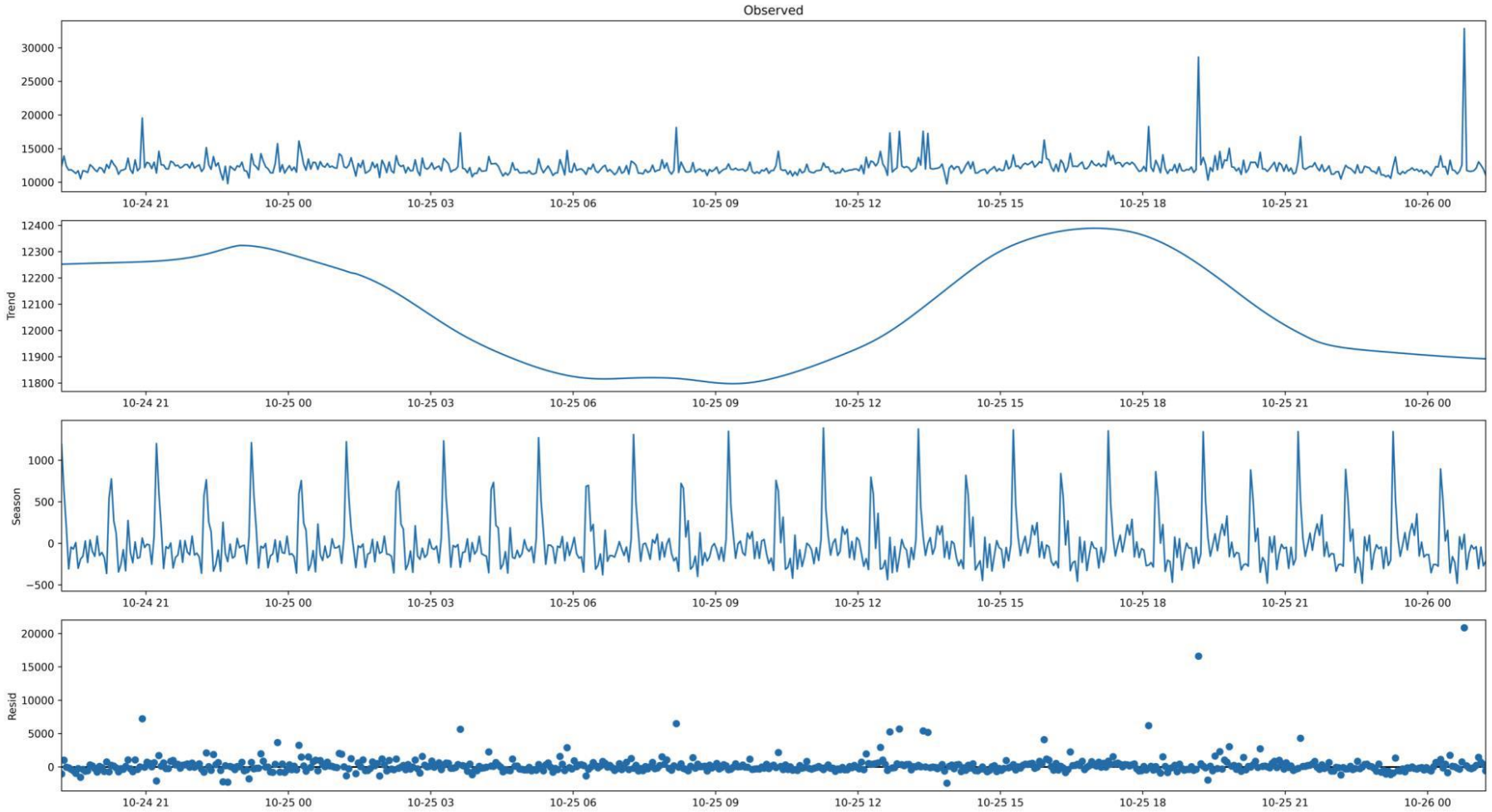
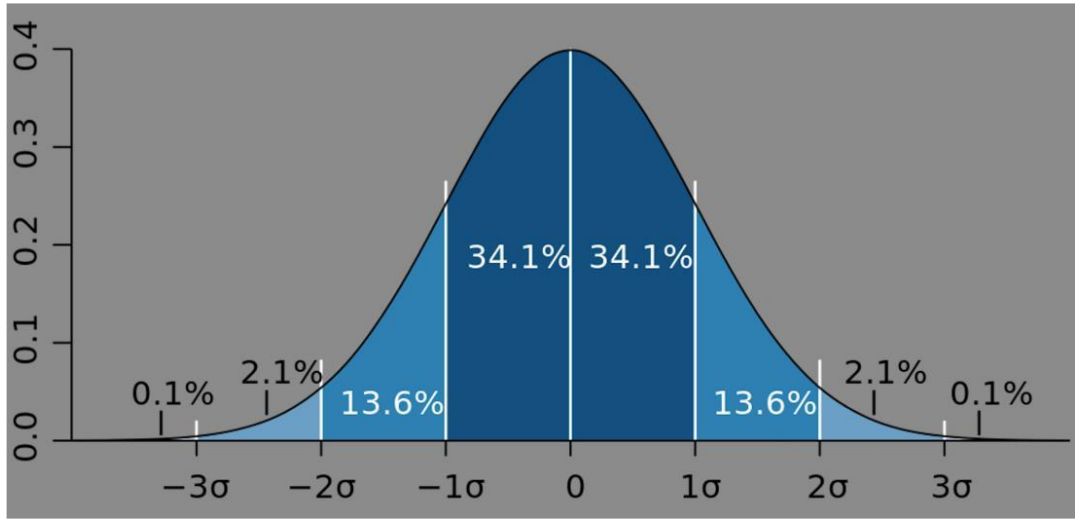
Decomposition using STL algorithm is a way to split a single time series sequence into three other sequences:



DEVIATIONS

Deviation is a measure of data variability.

How “far” values are from average?



Zabbix has capabilities to determine deviation in multiple ways.

FIND ANOMALY RATE WITH TRENDSTL

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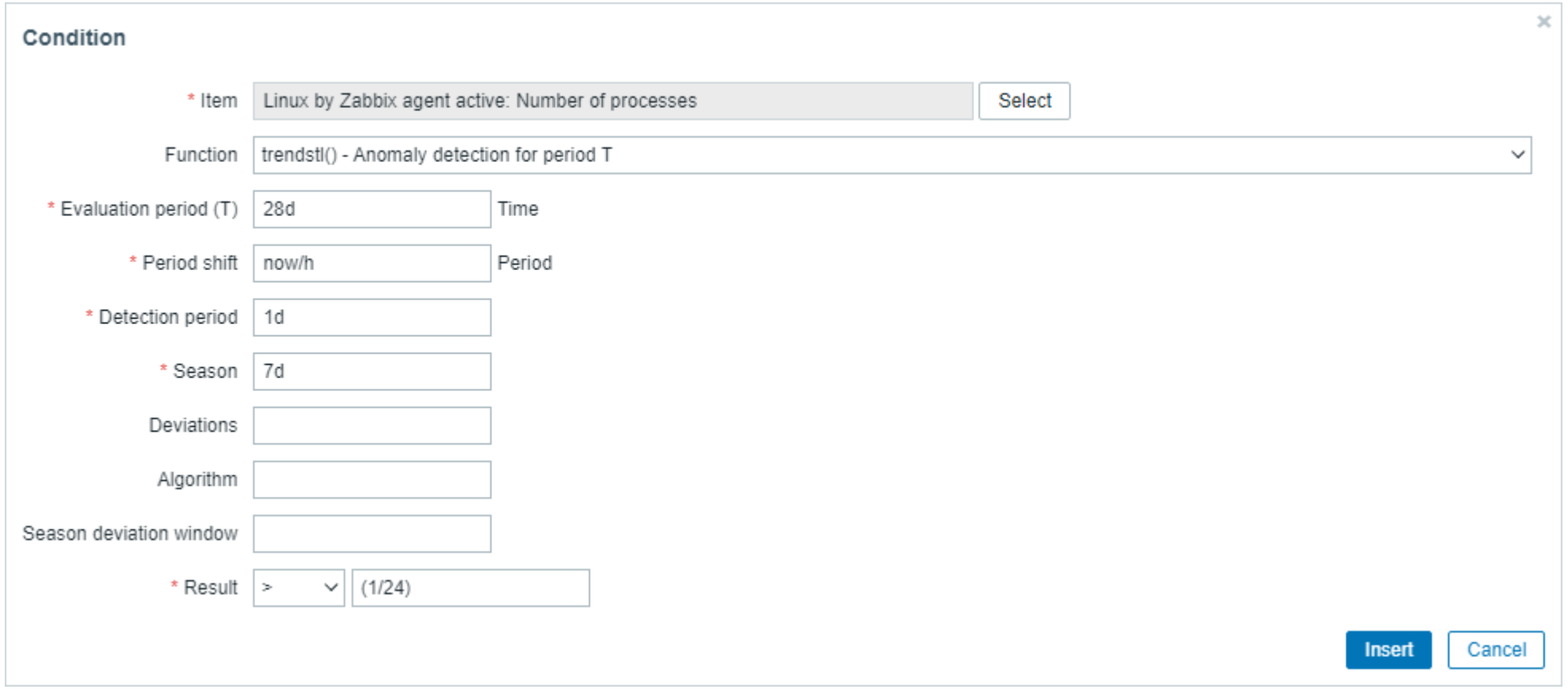
Data to work with: 28d, start to analyze starting from previous hour, use ‘1d’ to seek anomalies, weekdays matters (Season: 7d). Deviations – how many is considered as anomally (default: 3)



OUTPUT OF TRENDSTL FUNCTION

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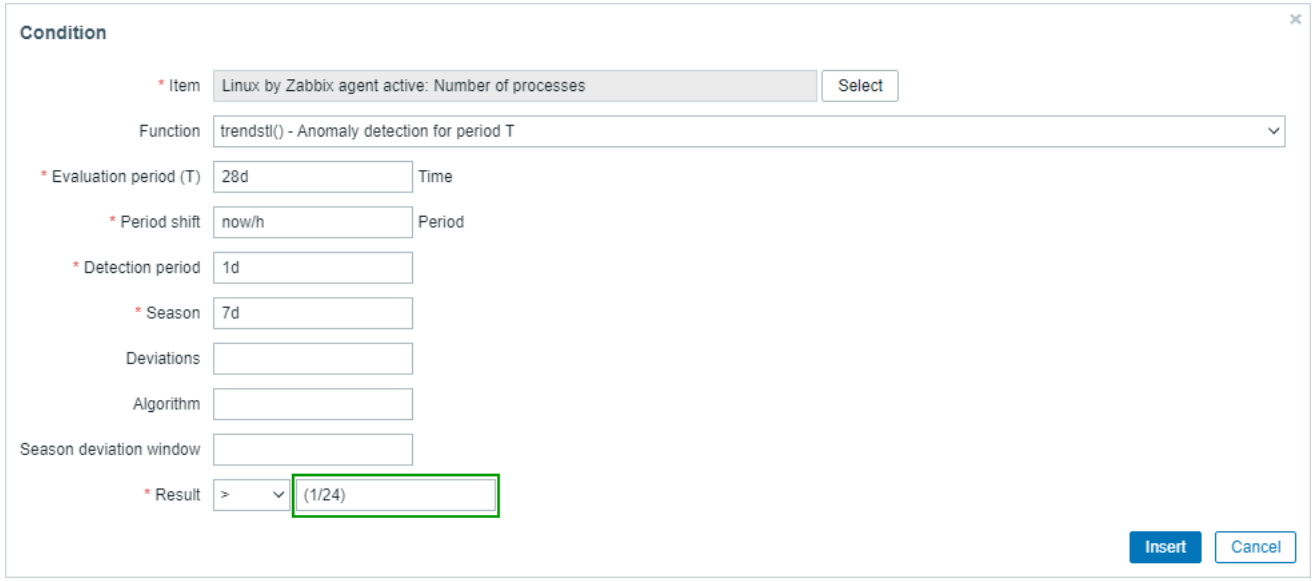
- a decimal value between 0 and 1
- (the number of anomaly values in detect period) / (total number of values in detect period).

Example 1: Context is 7d, detect anomalies in last 1d. If one is detected, then reported value is:

1/24 = 1 anomally detected within last 24h

Example 2: Context is 7d, detect anomalies for last 2d. If one is detected, then reported value is:

1/48 = 1 anomally detected within last 48h



DEVIATION ALGORITHMS

- mad (default) – «median absolute deviation»

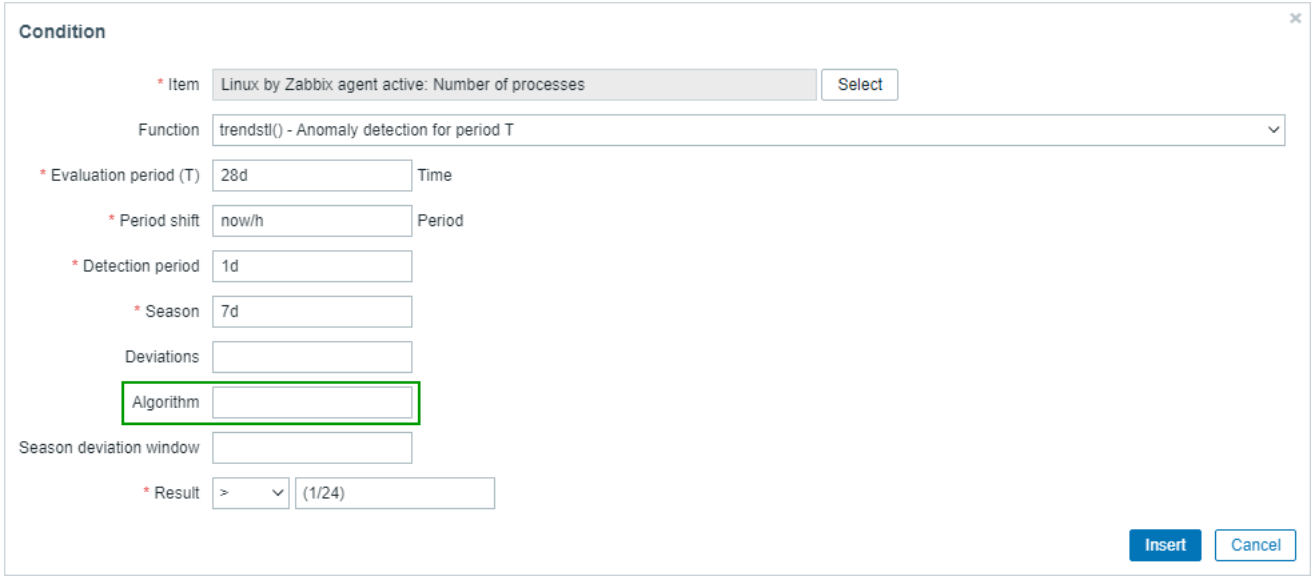
  A robust measure of the variability of a univariate sample of quantitative data.

- stddevpop – «population standard deviation»

  Looks at the square root of the variance of the set of numbers.

- stddevsamp – «sample standard deviation»

  Average distance of the observed data from the expected values



CONCEPT OF SEASION DATA

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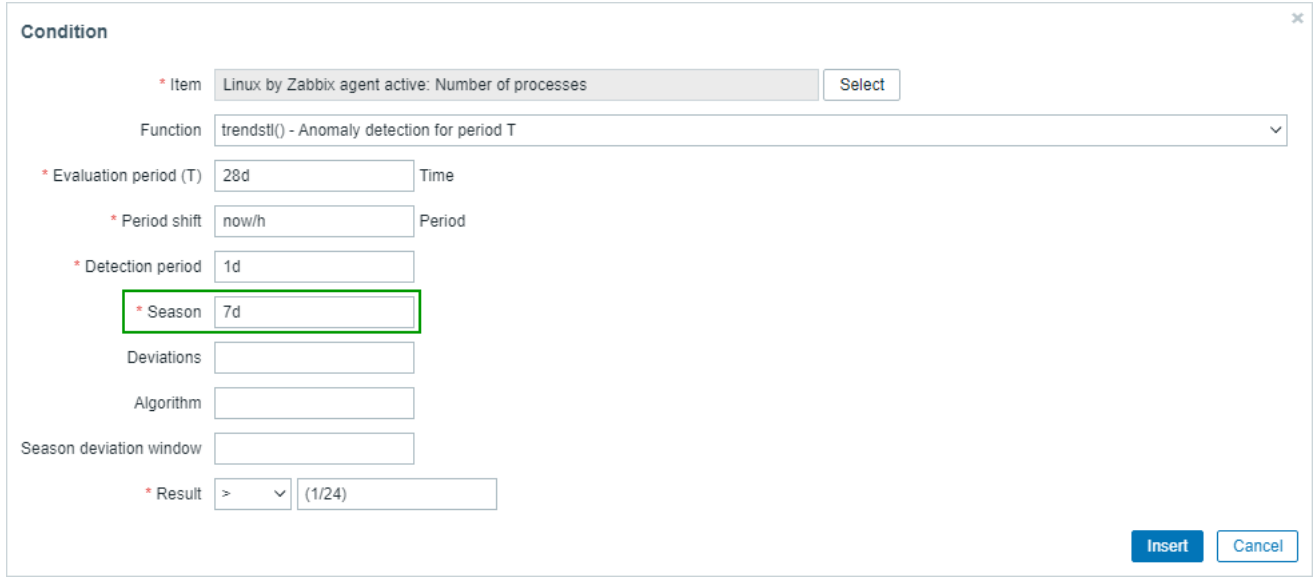
How the service has been used:

- All days are the same (24h scale)
- All Thuesdays are the same (7d scale)
- 8h working day in a 24/7 factory. There are 3 sessions in the level of 1d.
- First day of each month



CONCLUDION

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- Get trend values from the period
- Decompose values, get reminder
- Calculate deviation for values in remainder
- Select values with deviation and compare with threshold

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BASELINE MONITORING

WHAT IS BASELINE MONITORING?

- Baseline is a value derived from an average over multiple calendar periods of the same length.

BASELINE PROPERTIES

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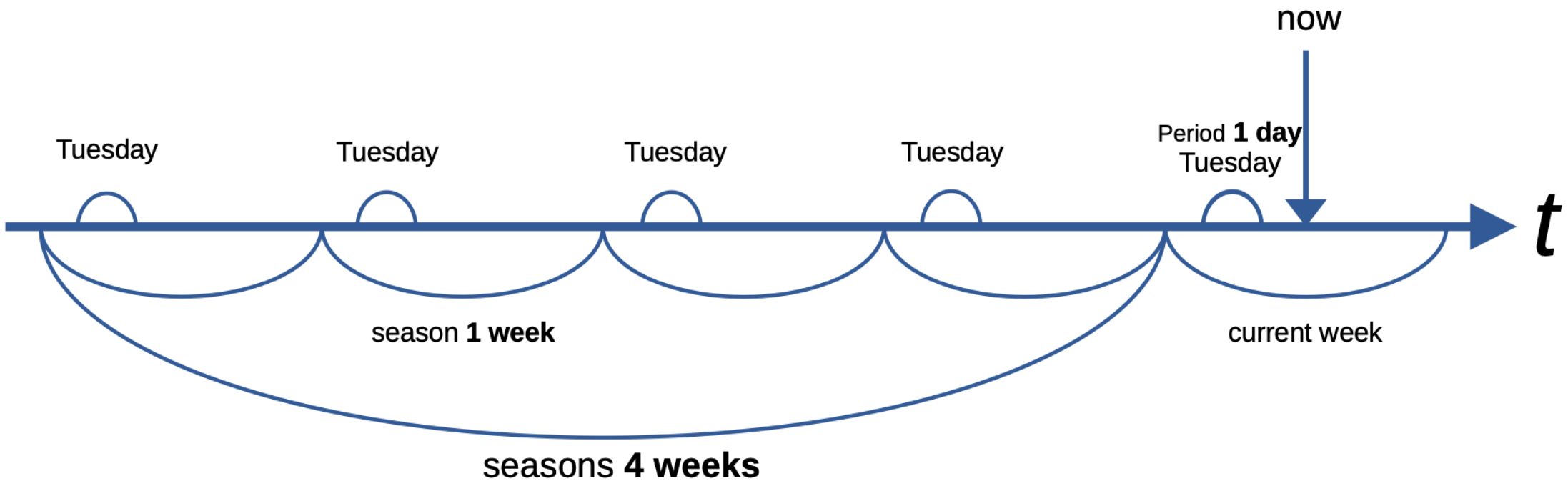
- Periods and seasons.
- Average from past calendar period:
  - E.g., every Monday of the past 4 weeks
  - Monday is a period, week is a season
- Periods are linked to current time:
  - If today is Wednesday, then periods are Tuesdays

PERIODS VS SEASONS



2 WAYS TO CALCULATE BASELINE

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- ‘baselinewma’ - Calculates the baseline by averaging data from the same timeframe in multiple equal time periods ('seasons') using the weighted moving average (WMA) algorithm.

- ‘baselinedev’ - Returns the number of deviations (by stddevpop algorithm) between the last data period and the same data periods in preceding seasons.

BASELINE WEIGHTED MOVING AVERAGE

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Check if CPU usage is 2x higher than WMA on the same weekdays over last 5 days (exclusive)

Triggers	Key	Interval	History	Trends	Type	Status
Triggers 2	system.cpu.util		7d	365d	Dependent item	Enabled

Severity	Name	Expression	Status
Warning	High CPU utilization (over {$CPU.UTIL.CRIT}% for 5m)	**min(**/Linux by Zabbix agent active/system.cpu.util,5m**)**>{$CPU.UTIL.CRIT}	Enabled
Average	CPU usage 2x bigger than in the last 5 seasons(d) (same last 4h)	**baselinewma(**/Linux by Zabbix agent active/system.cpu.util,4h:now/h,"d",5**)***2 < **trendavg(**/Linux by Zabbix agent active/system.cpu.util,4h:now/h**)**	Enabled

COUNT OF DEVIATIONS

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More than 3 deviations detected in the last 8h, by using using input periods from 12 weeks.

Triggers	Key	Interval	History	Trends	Type	Status
Triggers 1	system.cpu.switches	1m	7d	365d	Zabbix agent (active)	Enabled

Severity	Name	Expression	Status
Average	More than 3 deviations detected in the last 8h by using weekly input from last 12w	**baselinedev(**/Linux by Zabbix agent active/system.cpu.switches,8h:now/h,"w",12)>3	Enabled

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Thank you

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