

NSF/IUCRC CAC PROJECT

MONITORING, VISUALIZING, AND PREDICTING HEALTH STATUS OF HPC CENTERS

Jie Li

PhD Student, TTU

10/11/2019

Advisors:

Mr. Jon Hass, SW Architect, Dell Inc.

Dr. Alan Sill, Managing Director, HPCC, TTU

Dr. Yong Chen, Associate Professor, CS Dept, TTU

Dr. Tommy Dang, Assistant Professor, CS Dept, TTU

- ▶ Data frame(protocol) between aggregation and visualization
- ▶ How to aggregate and visualize large range of data, e.g. 1 week, 1 month, or 1 year?

DATA STRUCTURE

```
1  {
2    "requestTime": "Mon Sep 19 12:18:12 2019",
3    "timeRange": ["Mon Sep 16 12:18:12 2019", "Mon Sep 19 12:18:12 2019"],
4    "timeInterval": "1d",
5    "timeSteps": 3,
6    "jobHost": [
7      [
8        {
9          "jobId": 924461,
10         "execHost": ["10.101.1.1", "10.101.1.2"],
11         "powerMax": 266.0,
12         "powerMin": 240.0,
13         "powerAvg": 252.0
14       },
15       {
16         "jobId": 924462,
17         "execHost": ["10.101.1.2"],
18         "powerMax": 278.0,
19         "powerMin": 260.0,
20         "powerAvg": 266.0
21       }
22     ],
```

```
56  "userJob": {
57    "username_1": [
58      {"924461":
59        {
60          "submitTime": "Sat Sep 14 10:44:14 2019",
61          "startTime": "Mon Sep 16 02:34:47 2019",
62          "finishTime": null
63        }
64      ],
65      {"924464":
66        {
67          "submitTime": "Sat Sep 15 8:44:14 2019",
68          "startTime": "Mon Sep 16 01:34:47 2019",
69          "finishTime": "Mon Sep 16 02:44:47 2019"
70        }
71      ]
72    }
```

```
97  "hostDetail": [
98    {
99      "10.101.1.1": {
100        "fans": [
101          {
102            "name": "FAN_1",
103            "health": 0,
104            "speedMax": 9310,
105            "speedMin": 9280,
106            "speedAvg": 9300
107          },
```

```
130  "cpus": {
131    "loadMax": 33.77,
132    "loadMin": 32.66,
133    "loadAvg": 33.20
134  },
135  "memory": {
136    "memUsedMax": 54.9,
137    "memUsedMix": 52.9,
138    "memUsedAvg": 53.9
139  },
140  "temperature": [
141    {
142      "name": "CPU1 Temp",
143      "health": 0,
144      "tempMax": 47.00,
145      "tempMin": 42.00,
146      "tempAvg": 43.00
147    },
148    {
149      "name": "CPU2 Temp",
150      "health": 0,
151      "tempMax": 64.00,
```

Demo

PROBLEM

- ▶ How to aggregate and visualize large range of data, e.g. 1 week, 1 month, or 1 year?

Time consumption of query from visualization

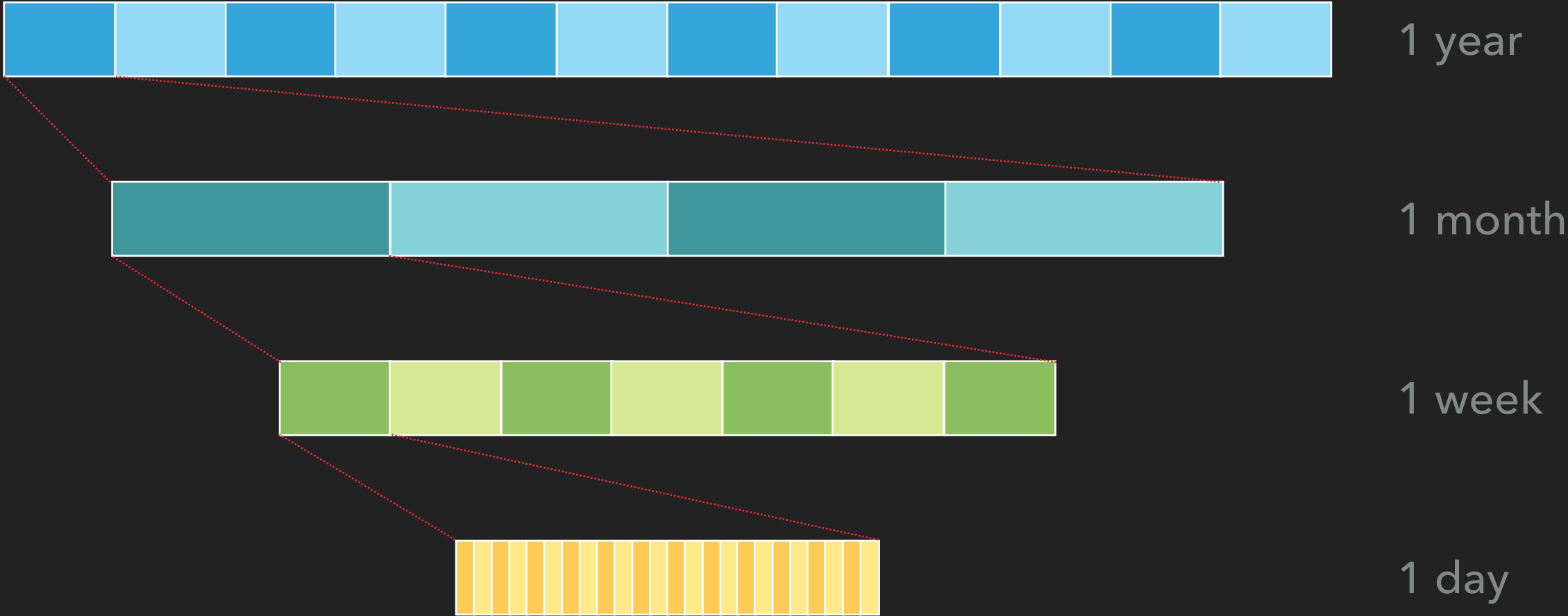
1 data point: 620ms

3 days of data(864 data points): 10mins

1 month of data: 100mins

1year of data: 1200mins

METHODOLOGY



METHODOLOGY

1 year



Update per month

1 month



Update per week

1 week



Update per day

1 day

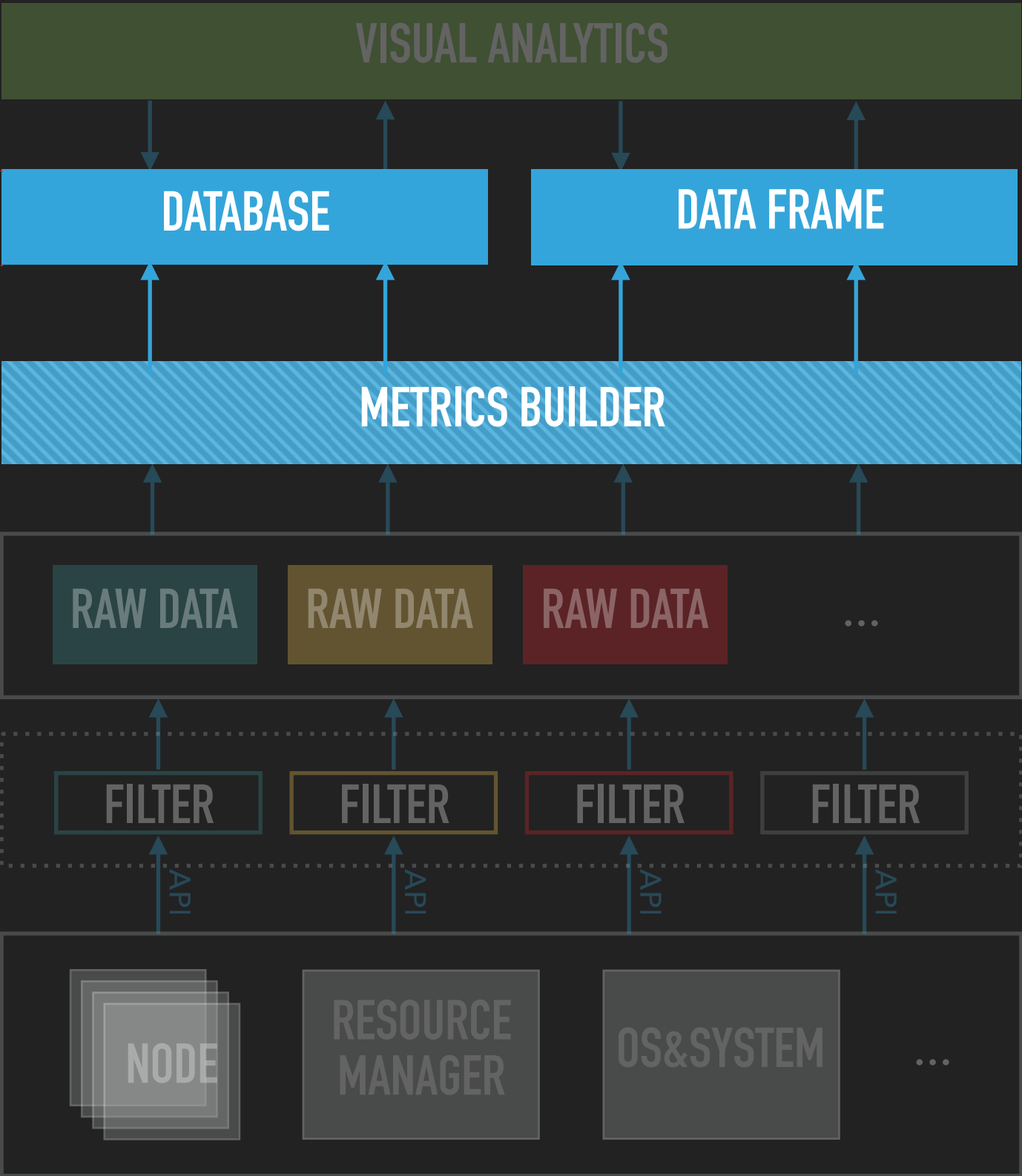


Update per hour


Real-time aggregation for granularity smaller than 1 hour
Only aggregate 60 records

METHODOLOGY

Table: Year
Table: Month
Table: Week
Table: Day



Real-time aggregation



QUESTIONS?/COMMENTS?