Average Active Sessions (AAS)

Deeper Meaning

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OakTableWorld 2018

Fundamentals

Active Session = Foreground in a DB call and not idle
(on CPU or in active Wait)

$$DB\ Time = \left[Total\ Active\ Session\ Time \right]_{t_0}^{t_1}$$

$$AAS = \frac{DB\ Time}{Elapsed\ Time} = \frac{DB\ Time}{(t_1 - t_0)}$$

MUST use same time units in numerator and denominator!

The Calculus of DB Time

$$DB\ Time = F(t)$$

$$F'(t) = \frac{dDB\ Time}{dt} = Active\ Sessions(t)$$

$$DB\ Time(t1) - DB\ Time(t0) = \int_{t_0}^{t_1} Active\ Sessions(t)\, dt$$

Time Model

ASH

ASH Math

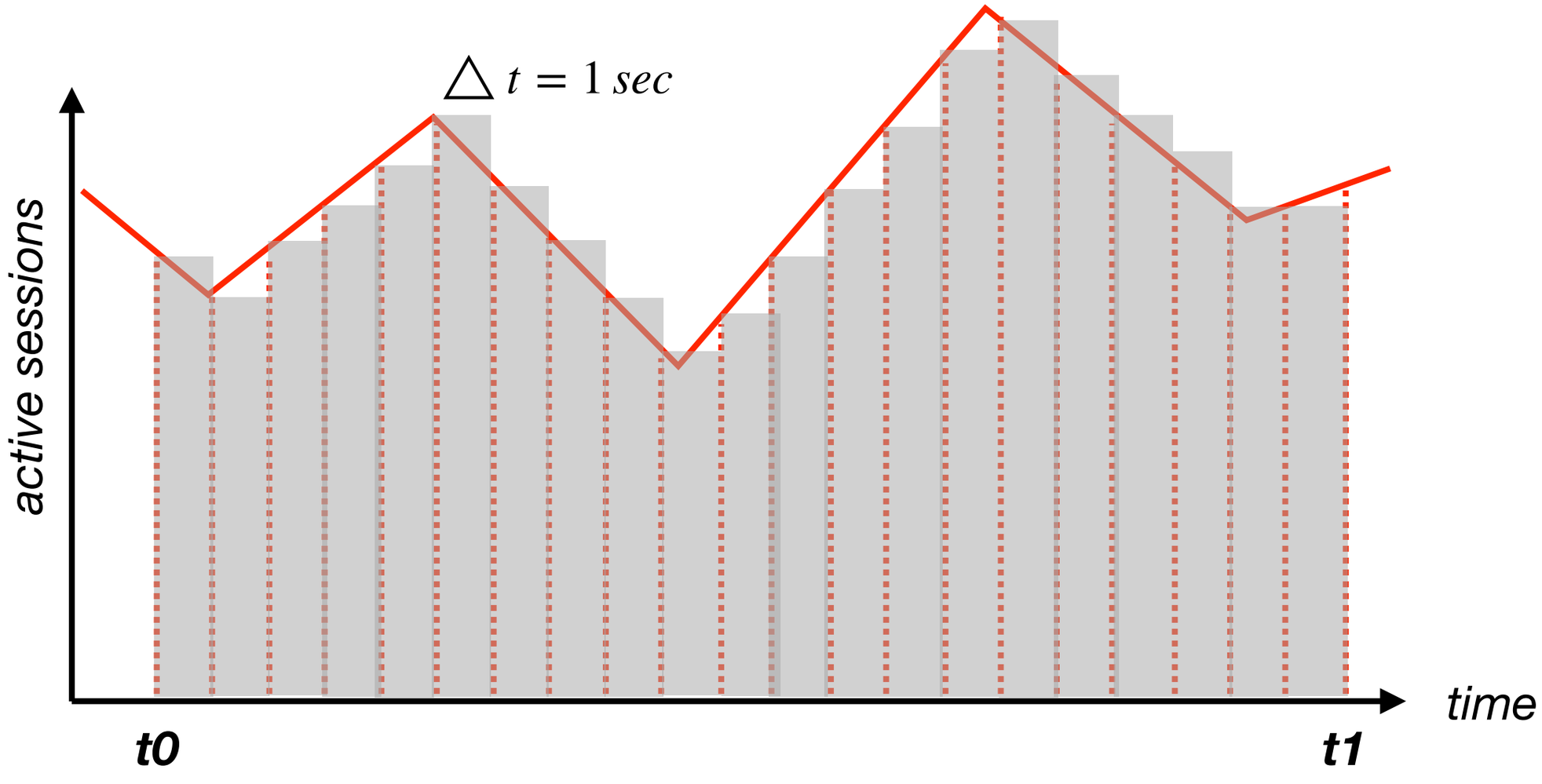
$$COUNT(*) = DB\ Time$$

$$COUNT(ASH\ Samples) = DB\ Time\ secs$$

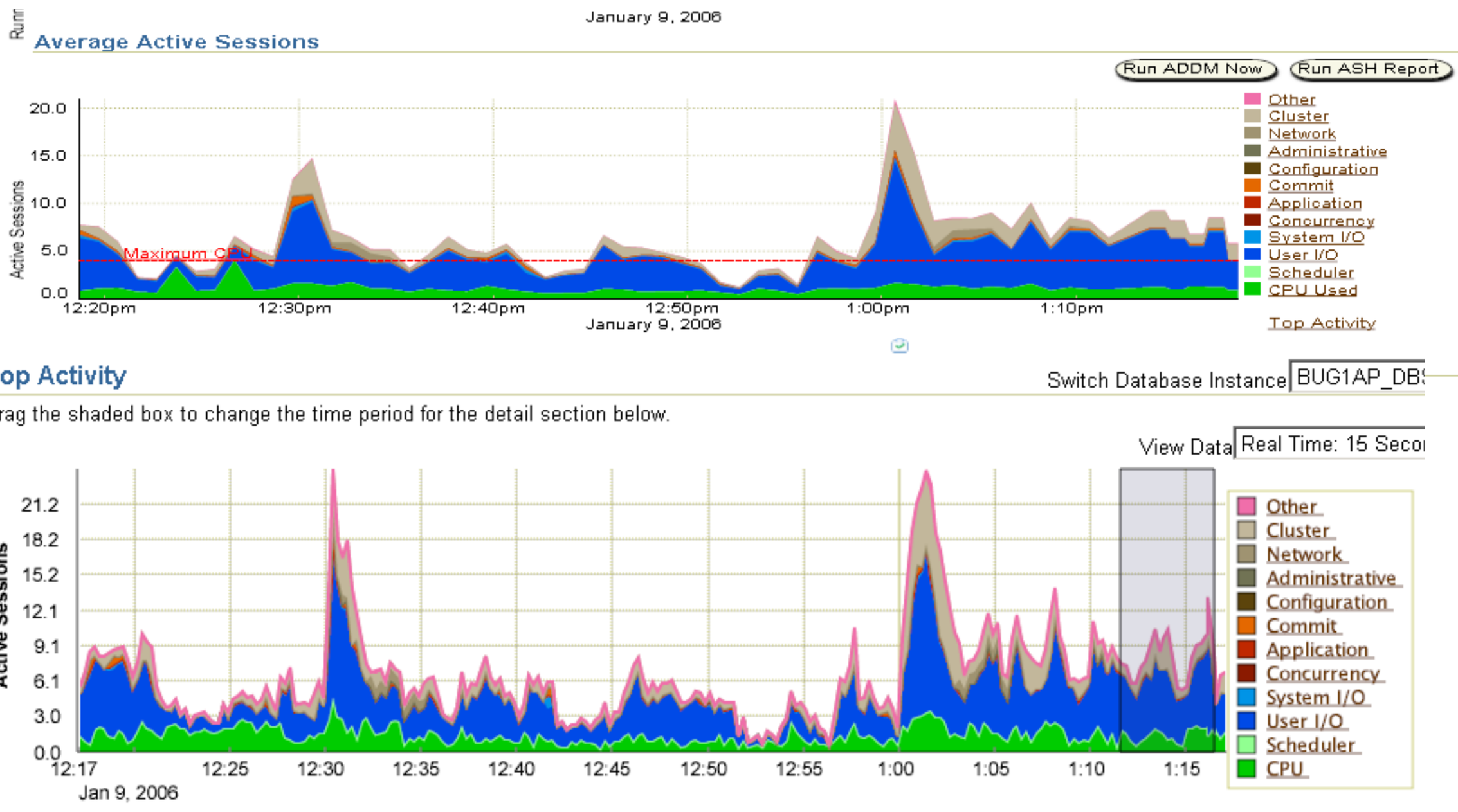
$$\sum_{t_0}^{t_1} Sample\ Count_i * Sample\ Interval_i = DB\ Time\ ms$$

ASH Math = Riemann Sum

$$\int_{t_0}^{t_1} Active\ Sessions(t)\, dt \approx \sum_{t_0}^{t_1} ASH\ Samples(t_i) * Interval$$



ASH ~ Time Model

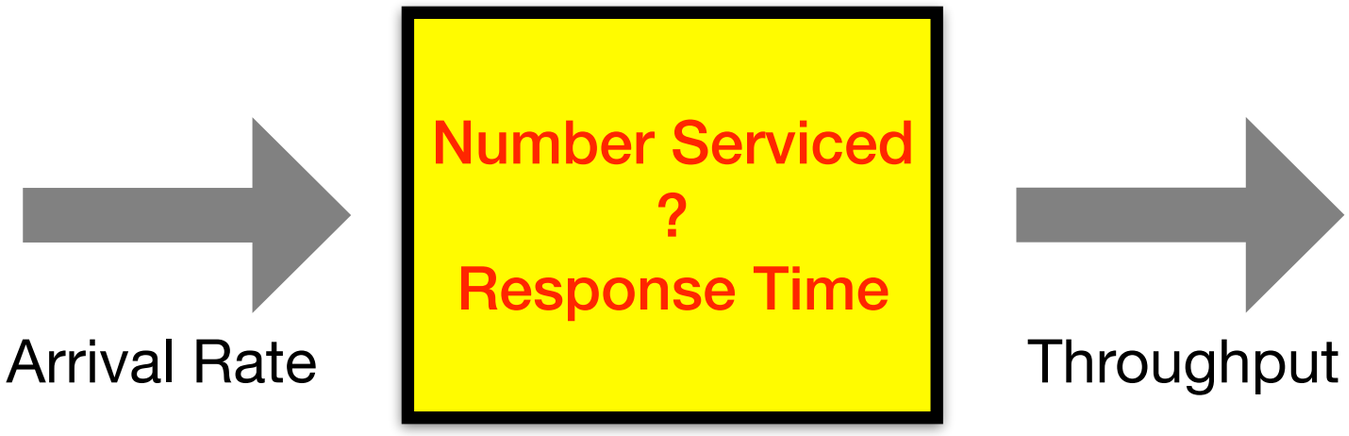


By the Fundamental Theorem of Calculus!

Takeaways

- Active Sessions(t) is the derivative of DB Time(t)
    - Thus DB Time is the integral of the Active Session function
- DB Performance Page is literally a picture of DB Time
    - Active Session integral = area under the curve = amount of DB Time
    - “click on the big stuff”: UI directly supports the Method
- ASH counts are Riemann sum estimates of DB Time
    - Top Activity and Performance Page are equivalent
    - “ASH Math” works
- *Average Active Sessions is a powerful and fundamental concept*

Queuing Theory



stable system: arrival rate = throughput

Little's Law

*number being serviced = throughput * mean response time*

Little's Law and Sysmetrics

$$number\ being\ serviced = Average\ Active\ Sessions$$

$$Average\ Active\ Sessions$$
$$= Response\ per\ Call * Calls\ per\ Second$$
$$= Response\ per\ Txn * Txns\ per\ Second$$

DB Time increases with either an increase in throughput or a degradation in response time

Thank You

https://github.com/jberesni/AAS-SQL

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