Adaptive Failure Detection via Heartbeat on Hadoop

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Outline

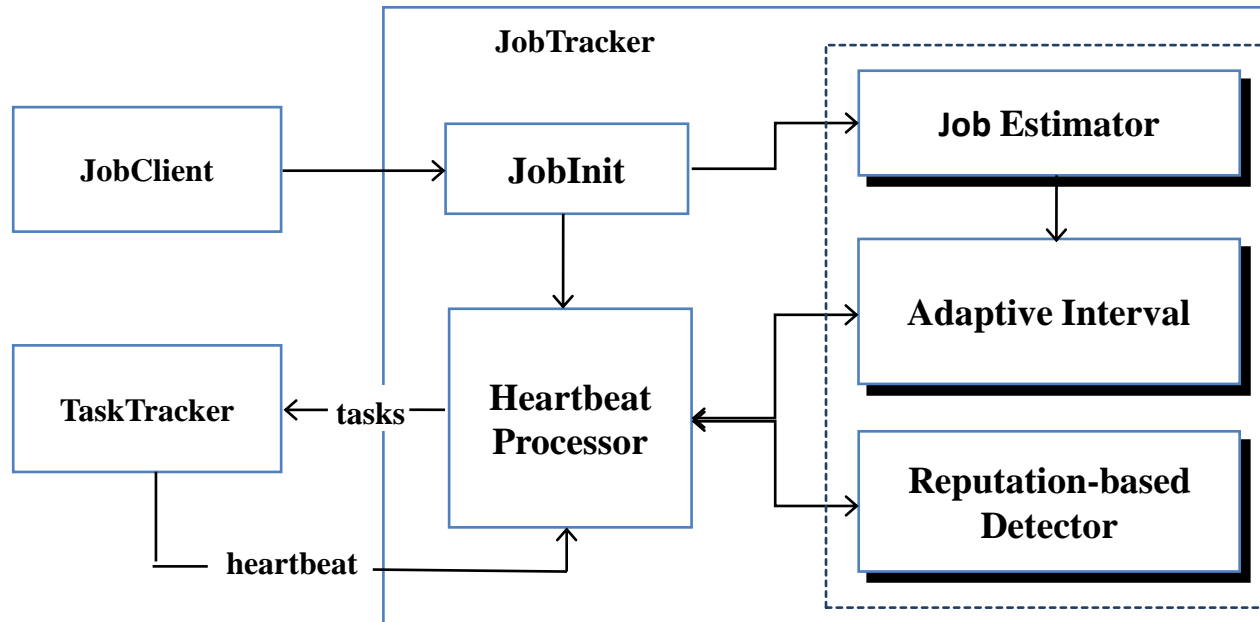- Problem
- Related Work
- Proposal
- Experiments
- QA

Problem

- Delayed detection of the failure worker

  - Increase execution time

  - Mis-blacklist

  - Unnecessary backup tasks

"Our goal is to effectively detect the failure in the MapReduce cluster"

Proposal

- Architecture

Proposal

- Adaptive expiry interval

  - Job Estimating model

    - $EET = \alpha * \dfrac{t_m}{n_m} + \beta * t_s + \beta * \dfrac{t_r}{n_r}$

  - Adaptive expiry interval

    - $TET = \begin{cases} EET & if\ EET < 10 \\ 10 & if\ EET \geq 10 \end{cases}$

◉ Reputation-based Failure detection

- Temporal and Spatial Characteristic
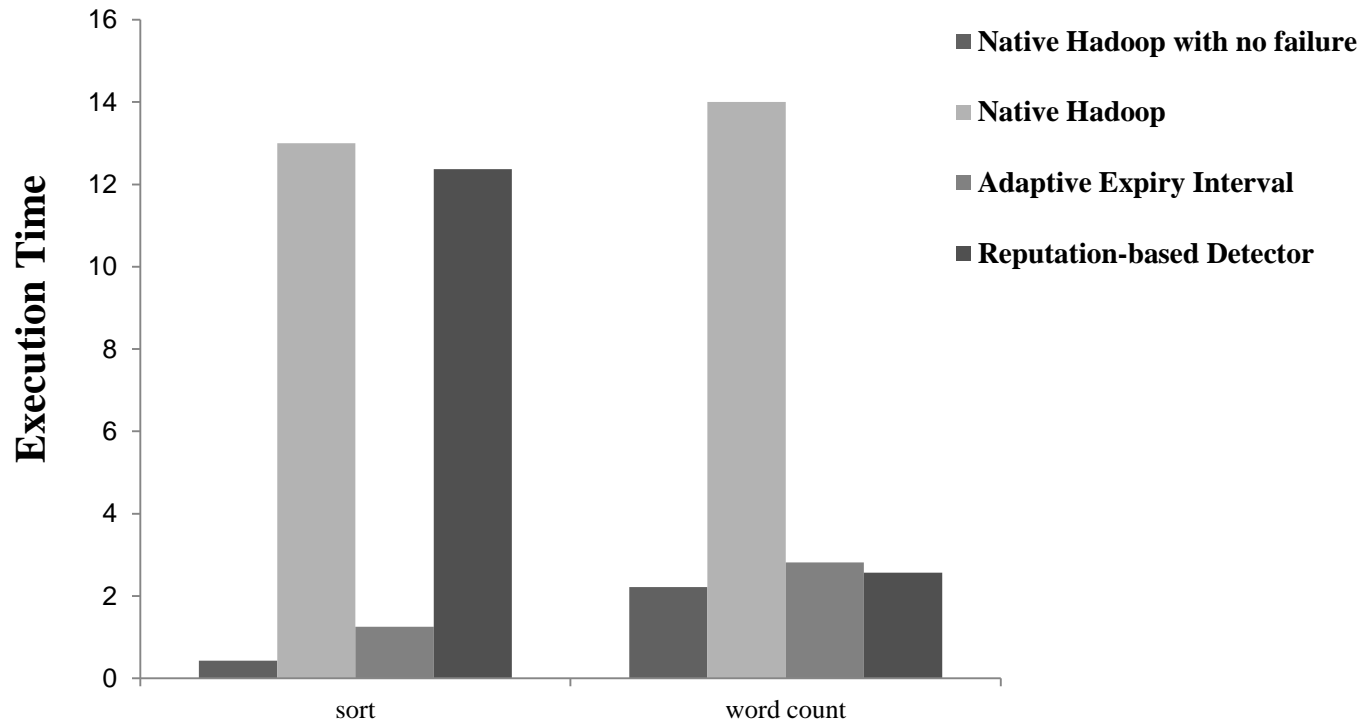
  - $P_t(\alpha_i, B) = \begin{cases} \rho * P_{t-1}(\alpha_i, B) & if\ \alpha_i \in\ \Phi(B) \\ \lambda * P_1(\alpha_i, B) & if\ \ \alpha_i \notin\ \Phi(B) \end{cases}$

- Reputation recovery

APPLICATION CONFIGURATIONS

Programs	Input Size	#Maps	#Reduces
sort	45M	10	15
word count	545M	60	170

Experiments

- Adaptive expiry interval
  - Prefer Short jobs
- Reputation-based detector
  - Prefer Long jobs

- Thanks

Q & A