

[YARN-6600] Extend lifetime to scheduler Leaf Queue

Goal

YARN supports lifetime monitor if user specify lifetime for an application. This control is from user end that his application should not run more than certain time period. But there are bad applications which could run more time consuming resources. Let's say, any application submitted to queue should not run more than 10 hours. So, once 10 hours elapsed, let's kill the application.

Proposal

Introduce default timeout for an applications at queue level. Any applications that are submitted to a queue has timeout period even though user has not specified. This is basically admin controlled timeout at queue level. Every queue has max-lifetime

- Leaf Queue level
 - Max-lifetime
 - This is **hard limit** for any applications.
 - Configuration for CS:
 - `yarn.scheduler.capacity.<queue-path>.maximum-application-lifetime=-1(infinity)`
 - If user is not specified app level lifetime then queue maximum lifetime value will be taken.
- Application level
 - YARN-3813 supports user specified timeouts per application.
 - Applications lifetime is **can not exceed** queue max-lifetime.

Existing Feature Interaction

Supporting default queue timeout need to be considered for feature interactions such as

- At submission
 - App-lifetime > 0? Validate app-value < max_lifetime_of_queue
 - App-lifetime =<0? App-lifetime = max_lifetime_of_queue
- Application lifetime updated?
 - Validate updated_lifetime_value > sumOf(app_submit_time + max_lifetime_of_queue)
 - updated_lifetime_value = sum(app_submit_time + max_lifetime_of_queue)
 - Cut off lifetime to queue timeout and send new timeout in response.

- $\text{updated_lifetime_value} \leq \text{sum}(\text{app_submit_time} + \text{max_lifetime_of_queue})$
 - Update the lifetime value as user provided

- Admin refresh-queue:
 - Admin increased max queue lifetime?
 - Running app do not get affected.
 - Admin decreased max queue lifetime?
 - No change to app. Running applications should NOT impacted.

- Move to queue
 - $\text{Max_lifetime_of_target_queue}$
 - $\text{max_lifetime_of_target_queue} \geq \text{max_lifetime_of_source_queue}$?
 - No change to app
 - $\text{max_lifetime_of_target_queue} < \text{max_lifetime_of_source_queue}$?
 - $\text{App_lifetime} \leq \text{sumOf}(\text{app_submit_time}, \text{max_lifetime_of_target_queue})$
 - No change to app
 - $\text{App_lifetime} > \text{sumOf}(\text{app_submit_time}, \text{max_lifetime_of_target_queue})$
 - // TODO
 - Should fail the move operation with asking additional flag to set!? If flag has been set, then application will be killed immediately after move succeed.