# ATSv2 Authentication

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This document is intended to cover design for ATSv2 Authentication

**Authentication for ATSv2 will be achieved via Kerberos Authentication and delegation tokens**. If authentication is enabled, each node collector manager will load a TimelineAuthenticationFilter. We will reuse this filter from ATSv1.
**The timeline authentication filter does the following:**

1. Login with Kerberos Principal and uses HTTP SPNEGO to authenticate HTTP requests.
2. After Kerberos authentication is successful, generates a delegation token(DT) using the supplied timeline delegation token manager, for following communication.
3. Identify the Delegation token in subsequent requests and if it is valid, allow the request to pass through to the Web Service.

**Note:** Current configurations for keytabs and principals in TimelineAuthenticationFilter would be reused in ATSv2 as well.

We will reuse the DelegationTokenAuthenticatedURL class for communication from TimelineClient to ensure above works. Using this, TimelineClient can either use Kerberos authentication or use delegation token for authentication.
In TimelineV2Client we would provide a mechanism to explicitly get delegation token. This call would however require Kerberos Authentication.

**The mechanism should be enough for communication from clients where Kerberos is available but for posting entities from AM where Kerberos may not be available we need a mechanism to pass delegation token to AM** so that it can be authorized to write entities to YARN ATS.

## Possible approaches for passing delegation tokens to AM:

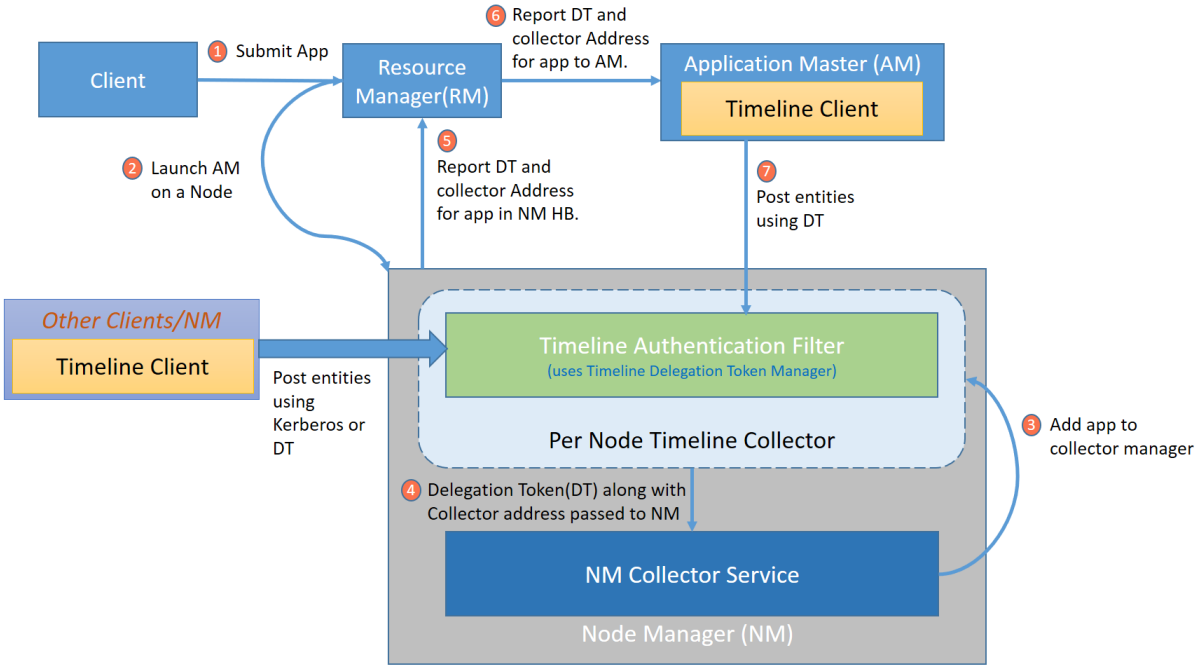
### *Approach 1: App Collector generates the delegation token by itself which is then passed onto NM->RM->AM*

This can be done as under:

1. Whenever an app is submitted to RM, AM container will be allocated on a particular node.
2. NM on receiving an AM container request, adds the App level timeline collector to Node collector manager (which is started by Per Node Timeline Collector aux service). Please note that the collector Manager binds to a free port.
3. After the application is added to collector manager, the collector address is returned back to NM. Collector manager though can additionally generate a delegation token (using timeline delegation token manager shared with timeline authentication filter) and pass it to NM.
4. The delegation token generated in step above and collector address can then be passed to RM and later RM can pass on this information to AM.

5. AM can update this token in its UGI when it receives it in Allocate Response and use it to post entities to Collector.
6. Delegation Token Manager inside Collector Manager can manage the lifecycle of a token as it will be notified when an app is removed (which in turn means the respective app collector is removed).

This is explained further via the diagram below.




***Note:*** *The design above only applies to managed AMs'. We currently do not launch collectors for either unmanaged AMs' or for off-application clients. Security design for them would follow after we finalize design for launching collectors for them.*
*Moreover, currently app collectors run within NM. All the collectors are managed by NMCollectorManager. In future though, a collector can run outside NM as a standalone process (which handles a set of apps for writing entities to backend) or we can even consider launching app level collectors as containers. Both will lead to additional communication, not captured in the diagram above. Please note, if app collectors are launched as containers, there will be a separate timeline auth filter and corresponding delegation token manager for each app collector instead of having it at the collector manager level.*
*PerNodeTimelineCollector displayed a separate box in the diagram above is to indicate that the auxiliary service can run outside NM as well.*

## Renewal and rolling of delegation tokens

Renewal and rolling of delegation tokens issued for managed AMs' will be handled by the respective App collector itself i.e. it will be tied with lifecycle of an app. Please note that app collector would be removed when an app finishes. Existence of an app collector means app is alive.

A configurable time period before expiry of token, app collector would explicitly renew the token and report it to NM via CollectorNodeManagerProtocol using the same message which is used to report new collector info. NM would then pass on this information to RM via NM heartbeat and RM would subsequently report it to AM.

Similarly, a configurable time period before max life time of token finishes, app collector would regenerate the token and pass it to NM like it does for token renewal.

Token Recovery for managed AMs'

Tokens for managed AMs' would not be stored in state store and hence if collector/NM crashes, tokens would not be recovered. We would instead regenerate the tokens on NM/collector recovery. This would be passed on along with the newly generated collector address to RM in NM heartbeat.

### *Approach 2: RM generates timeline token on behalf of Collector and loads it in Application Submission Context*

One of the drawbacks of first approach is that AM needs to do special handling for loading timeline tokens received in Allocate Response.

We can however let RM generate a timeline token as soon as an App is submitted. And add it in Application Submission Context. When a request for starting AM container is sent to NM, the collector will be started as well. We can thus extract the timeline token from the context and add it to timeline delegation token manager (corresponding to the node collector manager).

The token will be made available to AM as well as it is in the launch context. But as collector is not the one generating the token, IDs' may clash. To handle this, the kind of token generated by RM and collector manager can be different. But, required changes can be made to timeline authentication filter so that it will be able to identify both kinds of tokens for authentication.

### *Approach 3: NM generates timeline token on behalf of Collector and loads it in AM launch Context*

Same as approach 2, but instead of RM, NM generates the token and populates it in AM container launch context. The same token can then be passed onto collector manager. Alternatively, NM can wait for collector manager to generate a token before launching the AM. This however may lead to delay in launching of AM especially when collectors run outside NM. So, it's not a feasible option.

Based on the pros and cons of the approaches mentioned above, we will go ahead and implement Approach 1.

## Authentication for Timeline Reader

Like collectors, Timeline Reader will load the TimelineAuthenticationFilter on startup as well. And using it, requests sent to reader can be authenticated.

Additional Points:

1. Like for other modules, configurations will be introduced for loading keytab files and Kerberos principals in collectors and reader. For collectors, this would be required when they are running as standalone processes.