Revisiting the ESGF Node Manager for Federation Scalability

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Background

The current ESGF Node Manager handles:

- Capturing metrics
- Sharing node information across federations: certs, endpoints etc
- A mechanism to share common configuration files.

Drawbacks

- Limited scalability.
- P2P file/data exchange could be more secure, particularly configuration files.

Desirable features for next-gen Node Manager

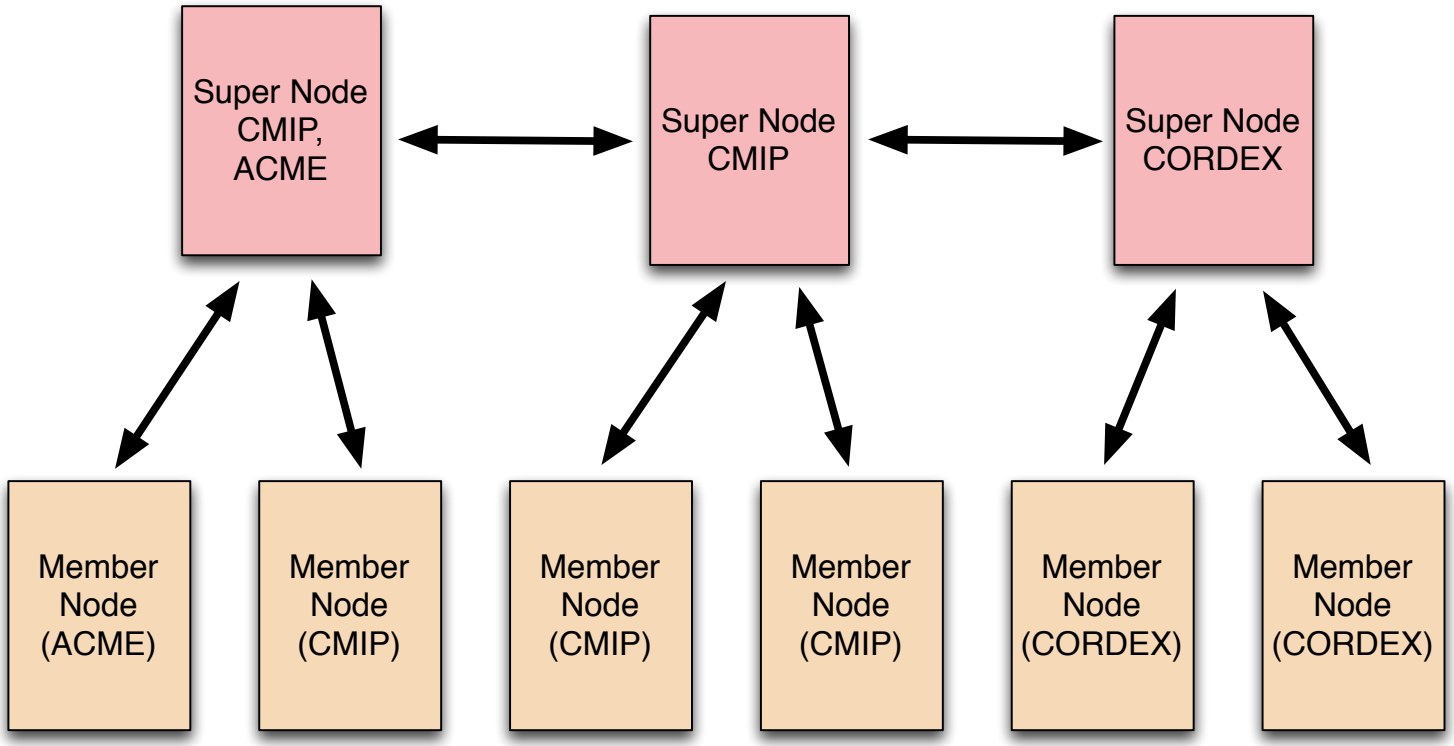
- Fault-tolerant distributed system, without a single point of failure.
- High scalability without overloading resources.
- Minimise communication overheads.
- PAN federation administration: handling cert requests, node memberships etc
- Consistent and highly available common configuration files
- Mechanism to ensure replica consistency across federation.

Node Manager types

Node managers can be of three different types.

1. Supernodes
   - A validated and reliable source for configuration directives, metrics, information about components etc, at project level.
   - Multiple concurrent supernodes for scalability, fault tolerance and load sharing.
   - Supernodes query other Node Managers for metrics and status.
   - A single Node Manager can serve as supernode to multiple projects or even as supernode to one and membernode to another etc.
2. Membernodes
   - Default Node Manager configuration
   - Cannot query other Node Managers.
3. Standby supernodes
   - The Node Managers run as supernodes only when too few supernodes are operational.

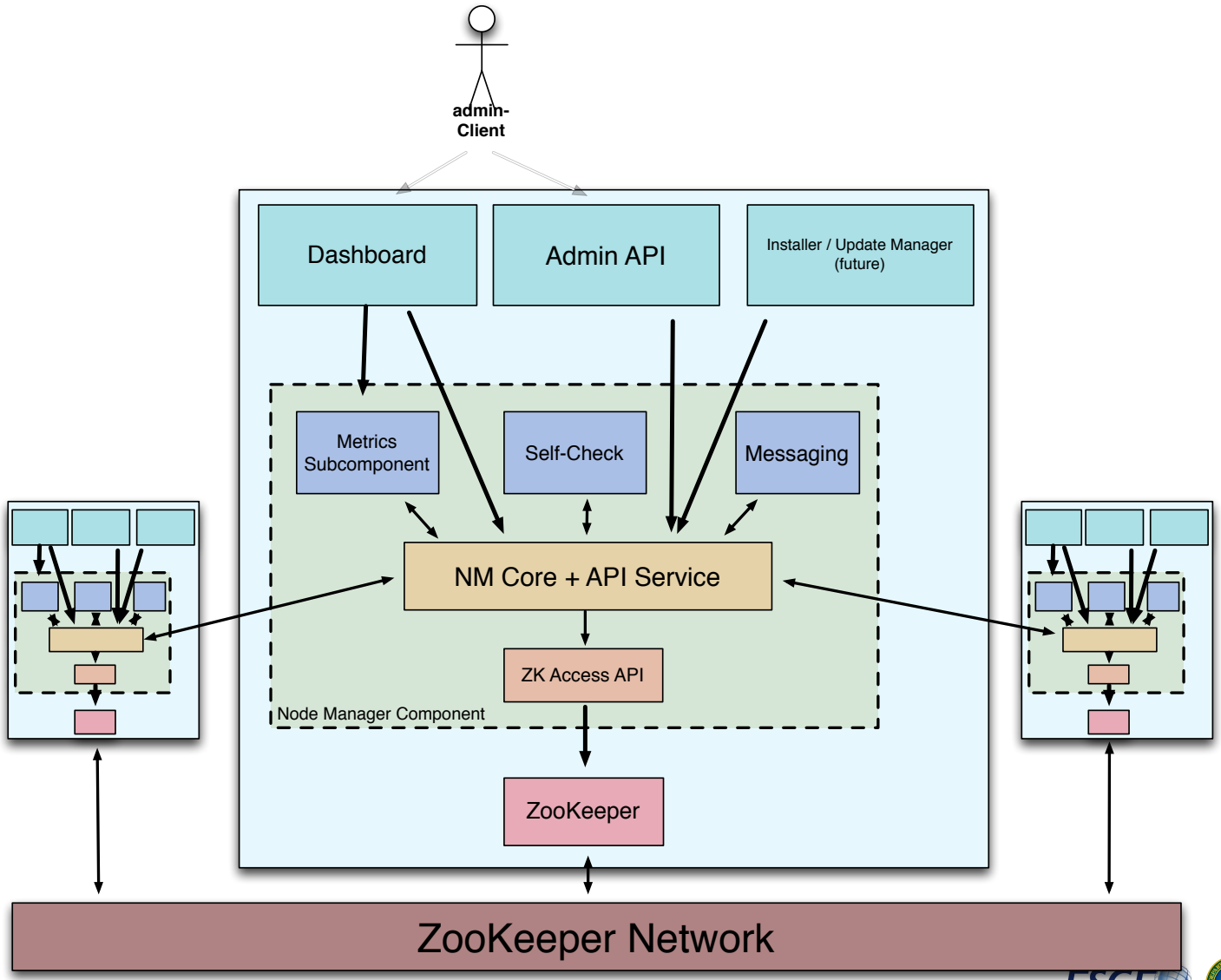
View of federated Node Managers



Node Manager components

- **Apache ZooKeeper**, to take care of group management (project), leader election for supernode management etc
- **ESGF Node Manager API**, to serve as a wrapper, for ZooKeeper and modify node's availability to be considered for use as supernode etc.
- **Metric collector**: query member nodes and aggregate them (supernodes)
- **Self-check component**: run sanity checks on self.
- **Messaging component**: alert notifications for local admins when services fail.
- **Admin console (local node)**: submit membership requests, CSRs, volunteer for supernode role etc
- **Admin console (supernode admin mode)**: sign CSRs, manage membership and volunteering requests etc.

Node Manager component diagram



Node Manager design considerations

- Security: factor for both user/machine executed elevated privilege operations.
- Design to guard against spoofing of membernodes/supernodes etc.