Hub data flows 2 ways of securing them

![Diagram of data flow]

**Authentication / Authorization mechanism**

1. Cookie Auth
2. Token Auth
3. Hub OAuth
4. Auth Service Creds
   - OAuth client secret/key -> Github, Google, etc
   - LDAP bind credentials -> LDAP
   - Running as Root -> Local PAM auth
   - LTI shared secret -> EdX, Canvas LTI
   - Signing key -> JWT
5. Spawner access credentials
   - Kubernetes credentials -> k8s
   - docker, sock access -> docker
   - Running as root -> systemd, local process
   - SCRUM / Torque / HPC creds -> batch spawners

*Control Path*  
*Data Path*
Data Confidentiality / Integrity Mechanism

1. HTTPS / Let's Encrypt
2. Internal HTTPS w/ proxy
3. Internal HTTPS
   - JupyterHub 1.0, if spawner supports it
   - Service Mesh → Istio, Linkerd ok.