

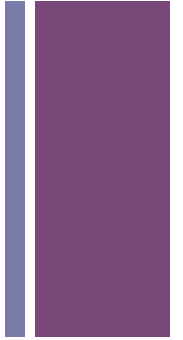


Insights to Hadoop Security Threats

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+ Problem Description



Current Hadoop Threat Model assumes that users cannot:

- Have root access to cluster machines
 - Node authentication(malicious join, leave)
- Have root access to shared client machines.
 - Impersonation: unauthorized user with a claimed fake identity(token, message)
- Read or modify packets on the network of the cluster
 - Traffic monitoring(user on the host get the traffic sending to and from another user)

Citation from “Towards a More Secure Apache Hadoop HDFS Infrastructure”, 2013



Problem Description(cont.)



Encryption and Storage security

- Data at rest encryption
- Data on the wire
- Temporal data
- Decryption
- Encryption Key
 - Trusted computing



Problem Description(cont.)

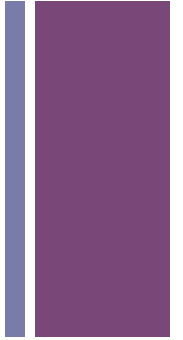


DoS attacks

- Rate limiting
- RPC Congestion Control with FairCallQueue
 - [HADOOP-9640](#)
- RPC Support for QoS in 2.1.0-beta
 - [RPHDFS-945](#) [HADOOP-9194](#)



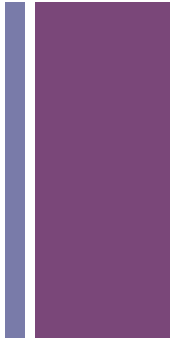
Conjectures



- Malicious node can join Hadoop cluster and leave easily
- Malicious user on a node can impersonate another user to access data, to operate Hadoop cluster
- Malicious user can intercept or decrypt messages and data sending from/to another user on the same host
- Malicious client can submit jobs continuously and significantly impact other client



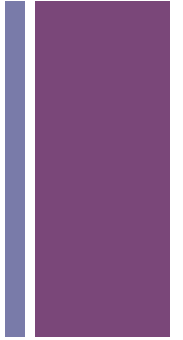
Evaluation



Release	Hortonworks	Hadoop	Hadoop
Version	HDP Sandbox 2.1	Stable 1.2.1	Stable 2.5.0

- Why Hortonworks, not Cloudera, MapR
 - Leader in activities of Apache Hadoop community
 - <http://adtmag.com/blogs/dev-watch/2014/03/hadoop-war.aspx>
 - <http://hortonworks.com/hdp/downloads/>

+ Evaluation(cont.)



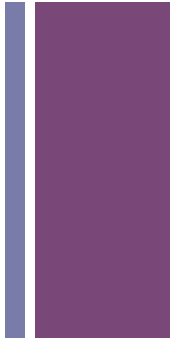
■ Resources

- Hadoop cluster: HGCC+VMs
- HDP(Hortonworks Data platform): VirtualBox

■ Skills

- MapReduce programming
- Scripts: bash, python
- Hadoop shell commands, configuration

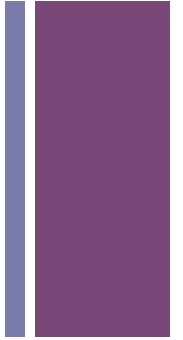
+ Criteria for Success



- Any node can join Hadoop cluster and leave without certain authentication
- Any node can forge identification, and the Hadoop cluster cannot spot this fake identity
- Unauthorized user can access HDFS file, change Hadoop configuration, make changes to Hadoop HDFS that impact other users

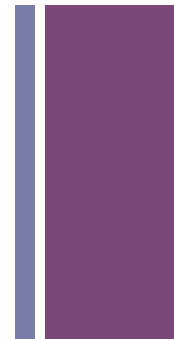


Criteria for Success(cont.)



- User on the same host can duplicate the traffic or decrypt content from the data traffic which belongs to another user on the same host.
- User on the same host get the job specification and temporal data belonged to another user
- One client can submit jobs continuously and significantly impact other submitted jobs
- One client can request data transmission frequently and decrease the average response time of data access

Validating any one of the above will be considered a success !



Thank you