From Incubation to Continuous Ingestion
The Story of Apache Gora

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Apache Gora

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Agenda

- What Apache Gora is
- How Apache Gora works
- Versioning
- GoraCI
- Gora-DynamoDB
- Future work

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- MapReduce support : Out-of-the-box and extensive MapReduce (Apache Hadoop) support for data in the data store.

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  - Flat files in local file system of Hadoop HDFS

How Gora works

- The Core Gora API
  - Store (org.apache.gora.store)
  - Persistency (org.apache.gora.persistency)
  - Query (org.apache.gora.query)
  - MapReduce (org.apache.gora.mapreduce)

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  - Base class for client interaction is o.a.g.s.impl.DataStoreBase (or FileBacked...) which is a base class for indirectly interacting with the DataStore. All DataStore implementations extend this class.

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  - As with the Store API, persistency has base classes for client interaction e.g. o.a.g.p.impl.BeanFactoryImpl, o.a.g.impl.PersistentBase and o.a.g.impl.StateManagerImpl respectively.

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  - In a common theme clients access core classes through the the classes in o.a.g.q.impl

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    - Including GoraMapper, GoraReducer, ALL Record Counter, Reader and Writer implementations.
    - Persistent and String Se/Deserialization is done in the Hadoop serializer using o.a.g.avro.@link PersistentDatumWriter (for writing Avro's dirty and readable information)with Avro's @link BinaryEncoder.

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    - Implements a system to store web server logs (10K lines) in Apache Hbase, analyze the results using Apache Hadoop and store the results either in HSQLDB or MySQL.
  - Tutorial Objectives.
    - Set the (Gora) Environment
    - Model the Data
    - The Core Gora API
    - MapReduce Support

Versioning

- Apache Hadoop - 1.0.1
- Apache Cassandra - 1.1.2
- Apache HBase - 0.90.4
- Apache Accumulo - 1.4.0
- Apache Avro - 1.3.3
- Amazon DynamoDB - Amazon SDK 1.3
- MySQL - 5.1.18
- HDBSQL - 2.2.8

GoraCI

- Based on Cloudbase tests
- Scale test
    - Ingest synthetic dada for extended periods.
    - Run continuous queries.
- Verify
    - Keeps running.
    - Ingest and queries fast.
    - No data lost.

GoraCI

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  - Follow linked list.
  - Record timing info.
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- Write 1 random node.
- Write 1 random node that references previous node.

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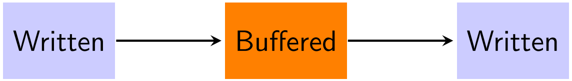
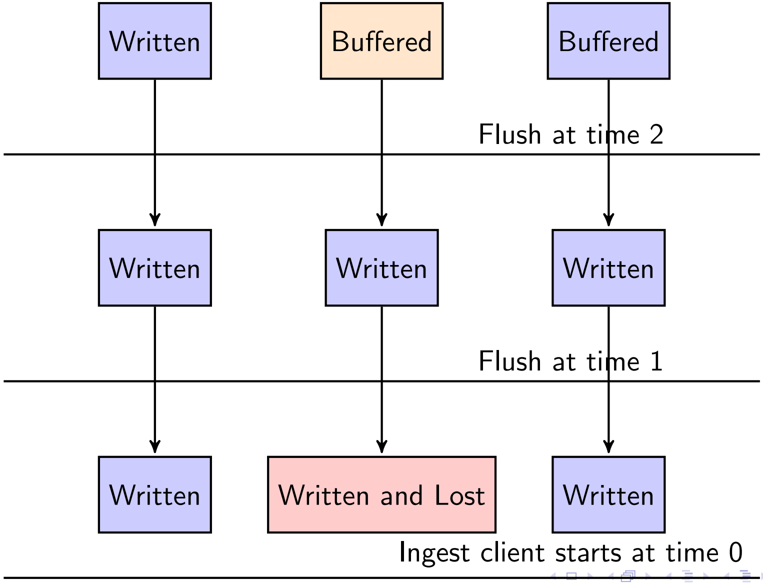


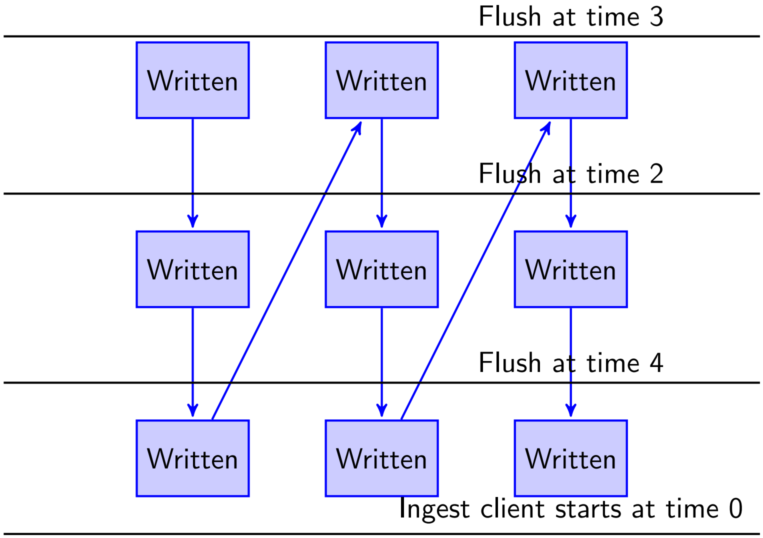
GoraCI

Only reference flushed nodes.



GoraCI

Giant Linked List.



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- Map.
  - <row>:-1
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- Verification MapReduce.
- Map.
  - <row>:-1
  - <row referenced>:<row>
- Reduce.
  - Brings references to and definition of node together.
  - Emits references to undefined nodes.

GoraCI

- Related JIRA issues:
    - HADOOP-6945
    - HBASE-5754
    - GORA-XXX

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- Motivation
    - Engage with the open source community by using some popular services such as Amazon WebServices.
    - Help n00bs to get familiar more easily with BigData technologies, specially for those who don't have access to big compute clusters ... like me.
    - Make the Gora Project more robust.

Gora-DynamoDB

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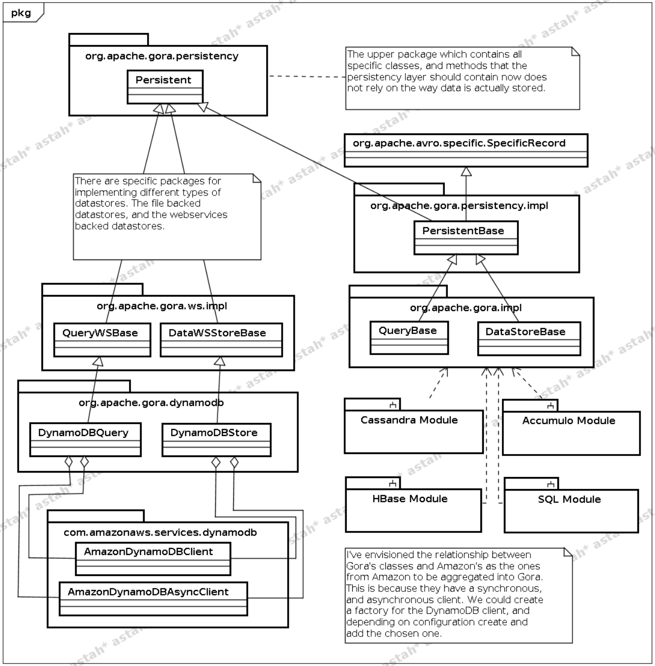
  - Create new abstraction for Gora internals: One for file backed data stores, and one for web service backed data stores.



The upper package which contains all specific classes, and methods that the persistency layer should contain now does not rely on the way data is actually stored.

There are specific packages for implementing different types of datastores. The file backed datastores, and the webservices backed datastores.

I've envisioned the relationship between Gora's classes and Amazon's as the ones from Amazon to be aggregated into Gora. This is because they have a synchronous, and asynchronous client. We could create a factory for the DynamoDB client, and depending on configuration create and add the chosen one.

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  - Gora-DynamoDB mapping file.
    - Schema definition.
    - Composite key definition: Hash key and/or range key.
    - Provisioned throughput.
    - Columns specifying their data types.

Future work

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- On our web service backed data stores:
    - Add new web based data stores: GAE, Microsoft Data Services.
    - Add batch write functionality to our Gora-DynamoDB module.
    - Add new data types for the Gora-DynamoDB module.
    - Add cost based control for our web based data stores.
    - Fully integrate them with Apache Nutch.

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- Add optimistic concurrency control for our data stores.

Questions

Thanks

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