

HIGH PERFORMANCE **IN-MEMORY COMPUTING** **WITH APACHE IGNITE**

BUILDING LOW LATENCY, NEAR REAL-TIME APPLICATION





JDBC

ODBC

.Net

C++

PHP

Memcached

Compute grid

Service grid

SQL grid ([new](#))

Machine
learning ([new](#))

Key-value
store

Streaming

BigData
accelerator

ORM support
([new](#))

IN-MEMORY STORAGE

(On-heap & Off-heap)

Native Persistence ([new](#))
(Flash, SSD, Intel 3d XPoint)

Third-party Persistence
(HDFS, NoSQL, RDBMS)

Docker

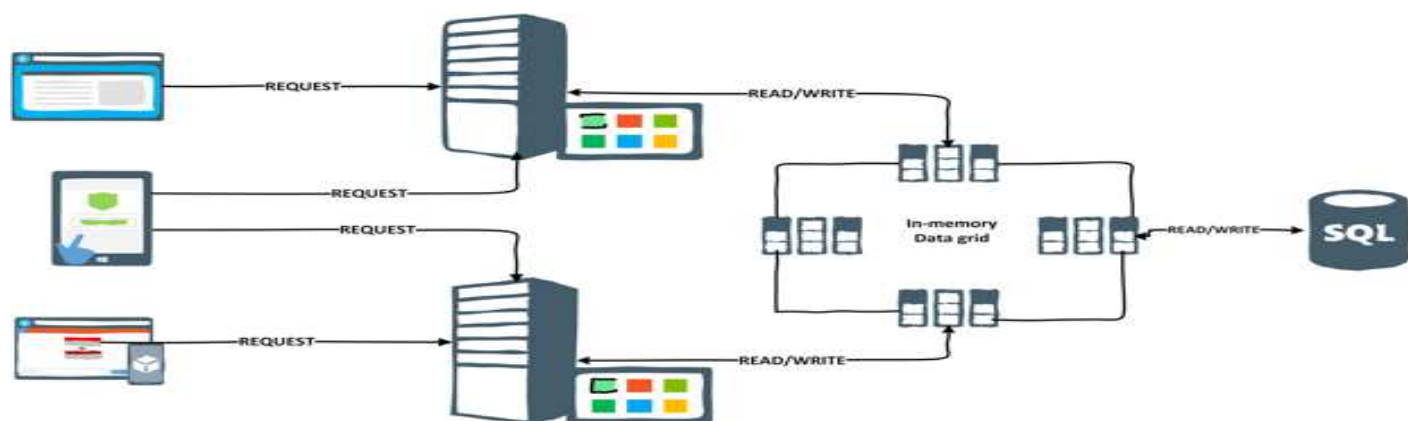
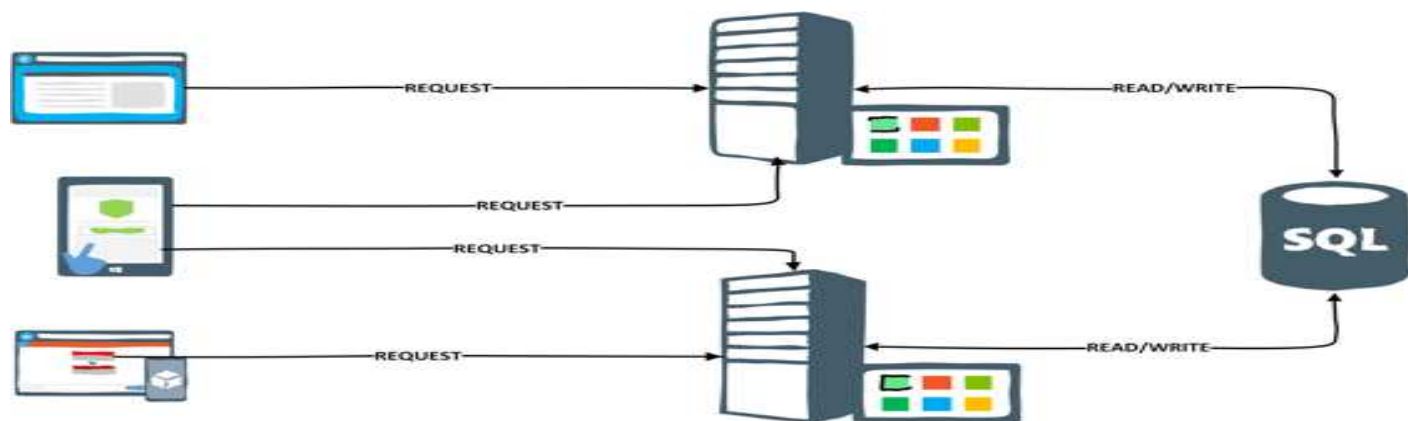
AWS

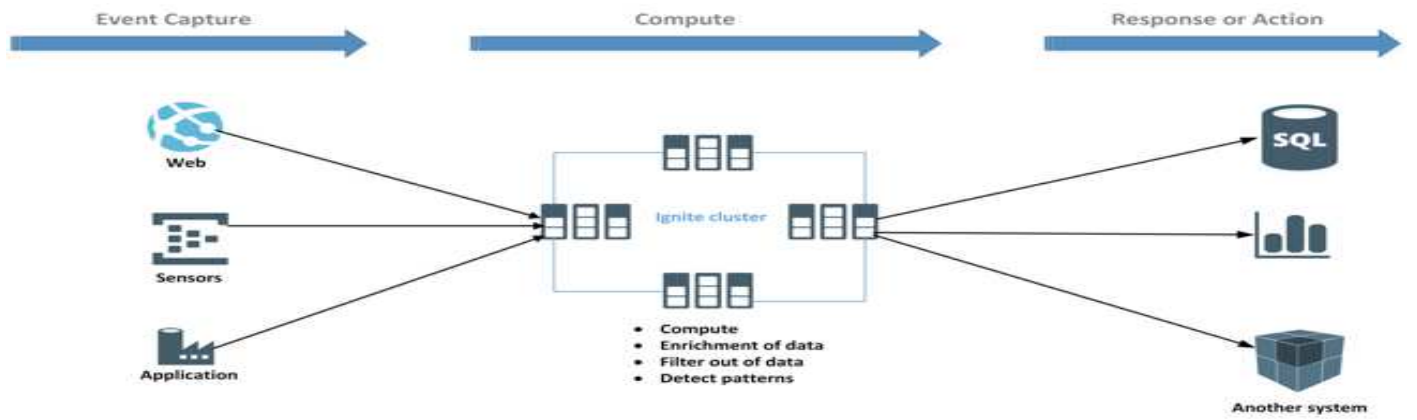
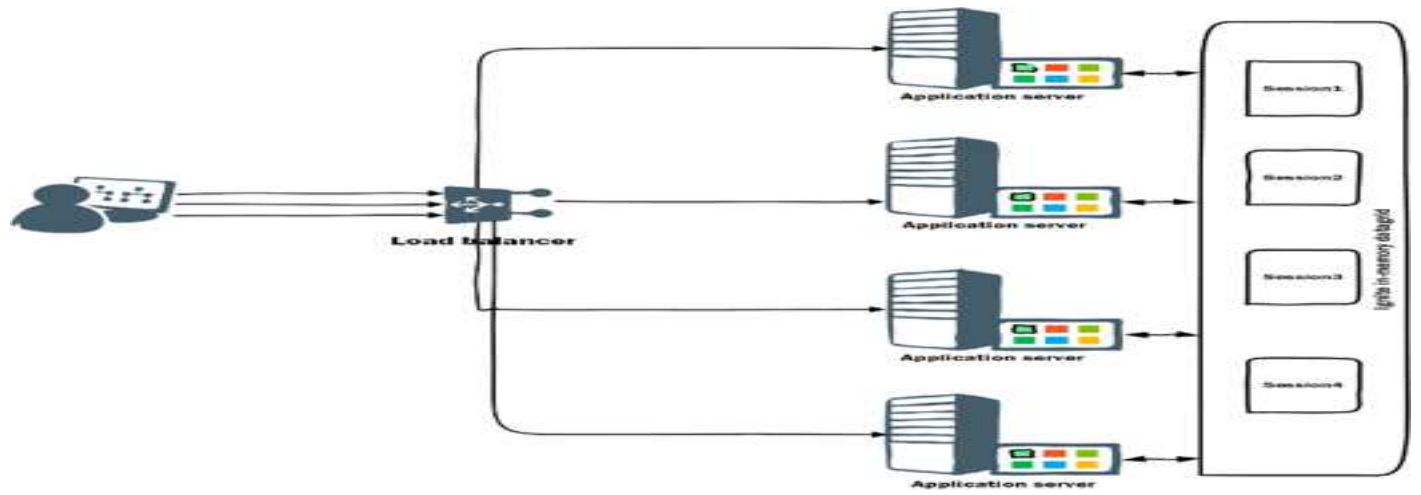
Google

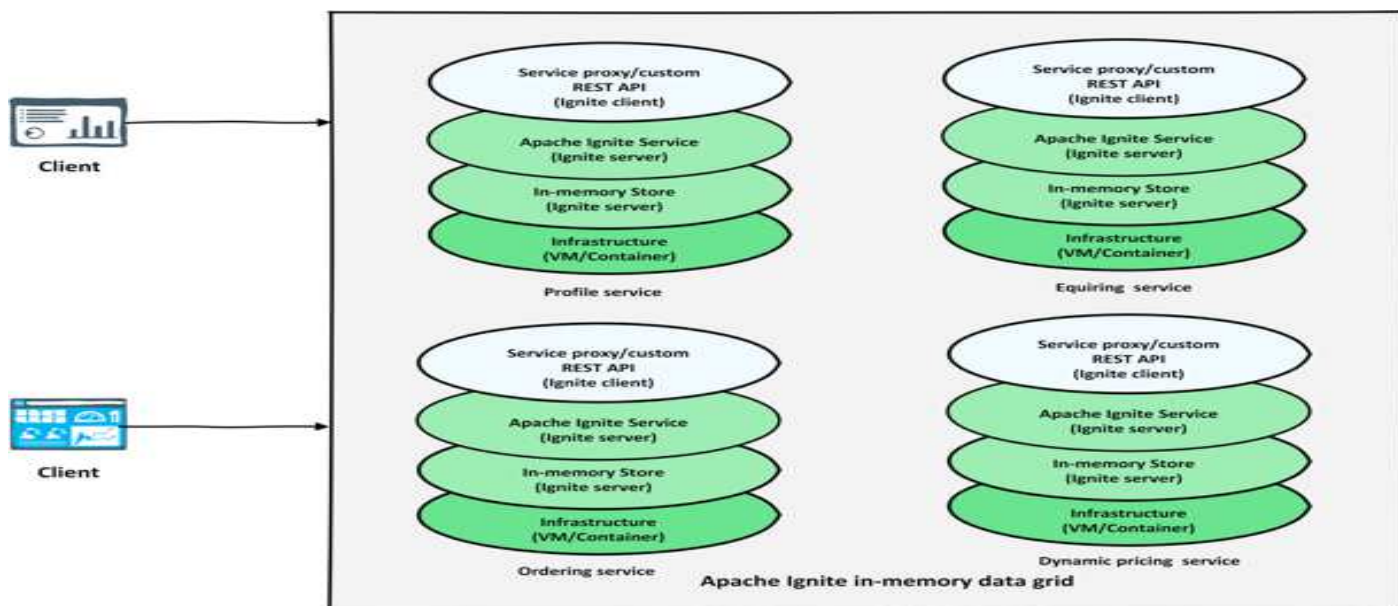
Mesos

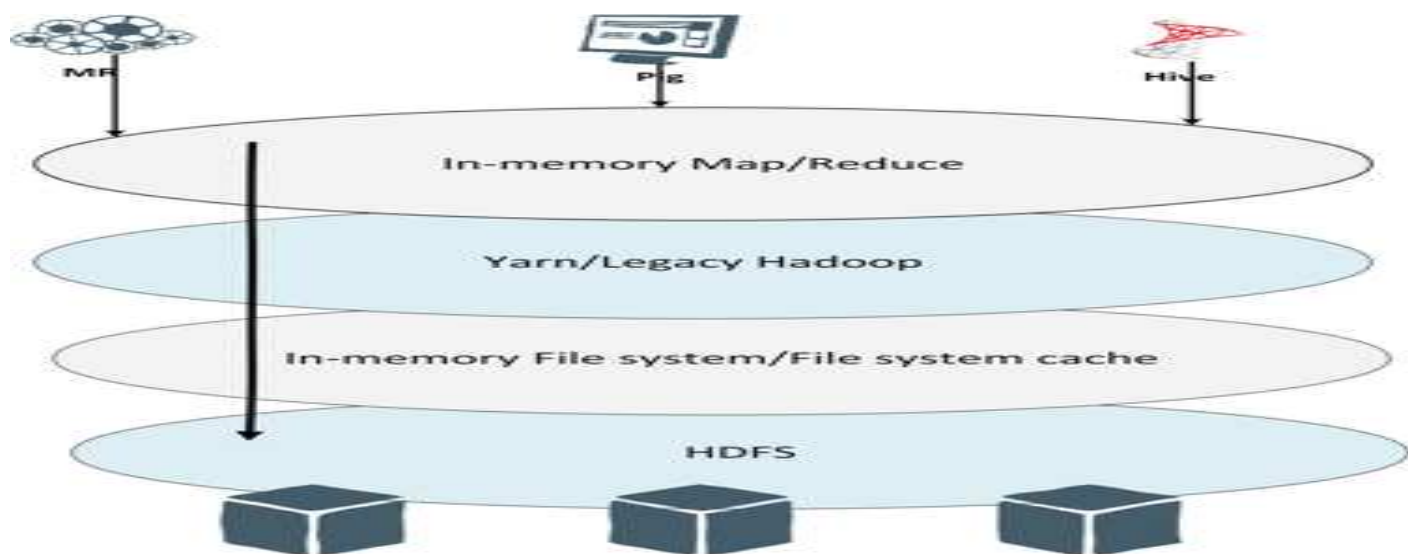
YARN

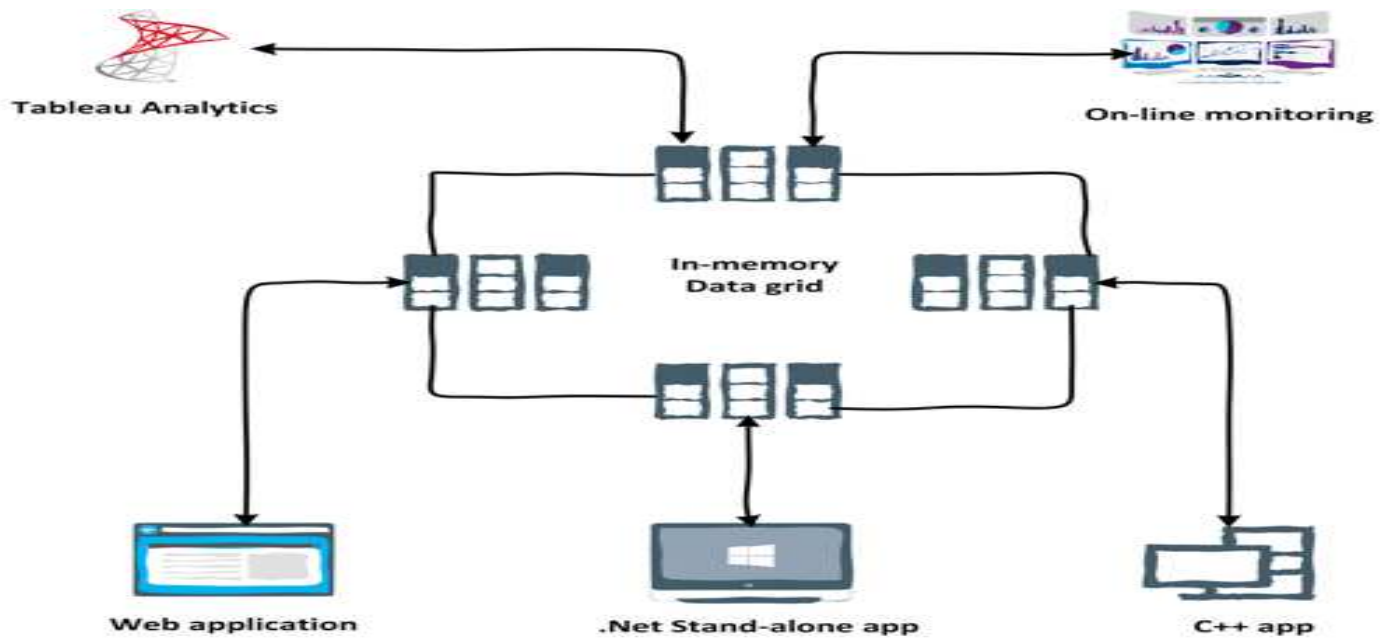
Kubernetes ([new](#))



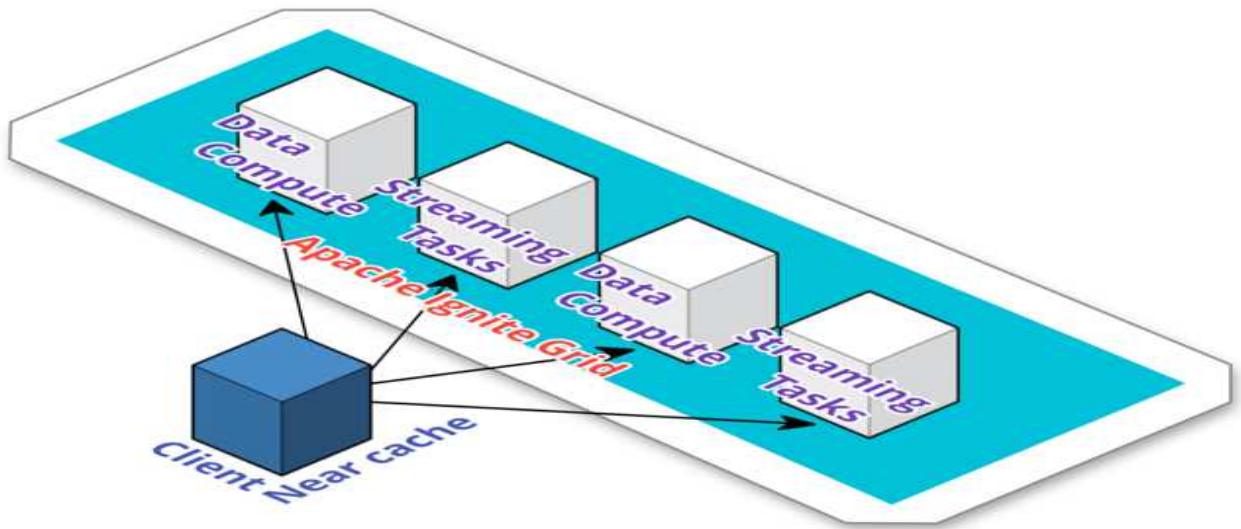


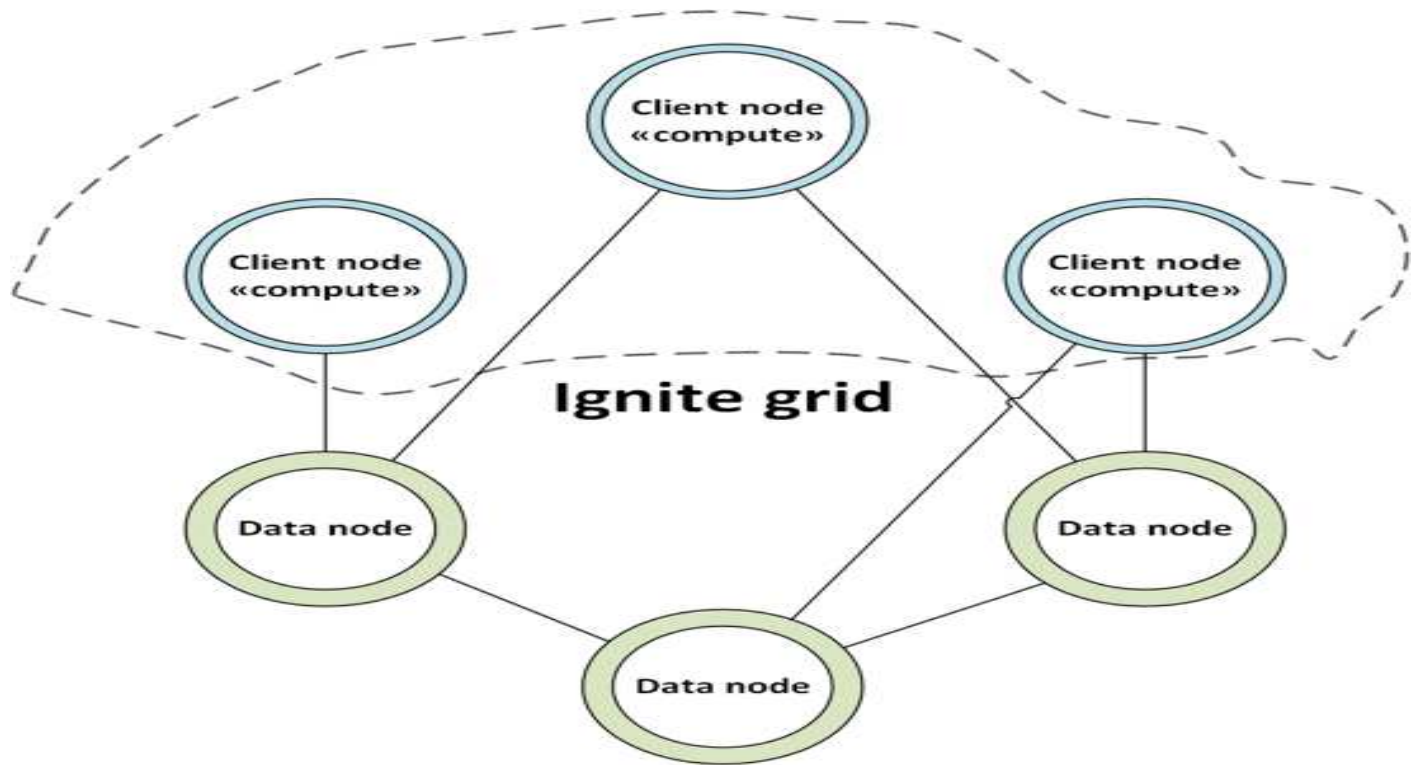


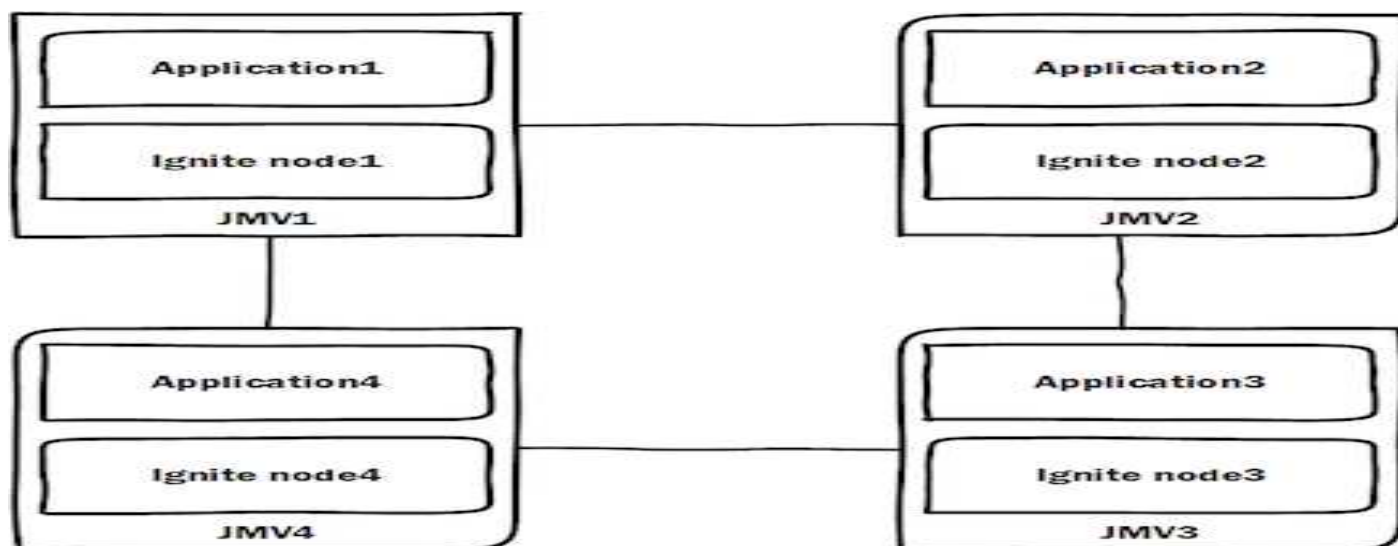




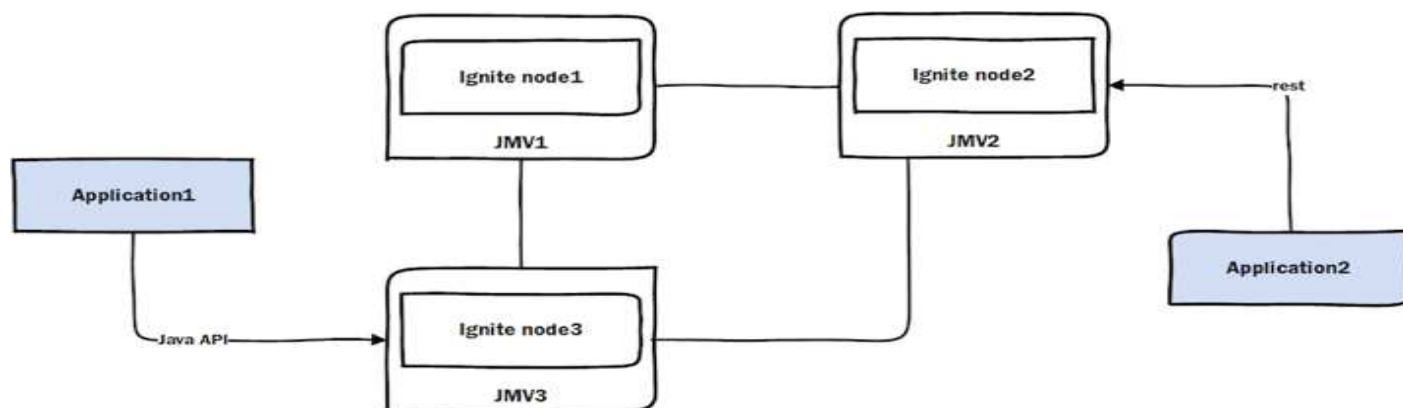
MapReduce, ForkJoin, Job Scheduling, Closure	Management Visor, Web console, JMX	API <i>Java, .Net, C++, Rest</i>		Streaming and CEP Ignite Data Streamer, Storm, Kafka, Flume, Camel
		Drivers <i>JDBC, ODBC</i>		
		Messaging <i>Topic Based messaging, local & remote events</i>		
		Data structures <i>Queue, Set, Atomic types, Semaphore</i>		
	Data Grid <i>Jcache, web session clustering, transactions, SQL queries</i>			
	Caching <i>Partitioned, Replicated</i>	Storage <i>On-heap, Off-heap</i>		
	Big data accelerator <i>In-memory Map/Reduce, IGFS, Hadoop FS cache, Spark</i>			
	Networking <i>IPv4, IPv6</i>			
	Cluster deployment <i>AWS, VCenter, Docker, Mesos, Yarn, Google cloud</i>			

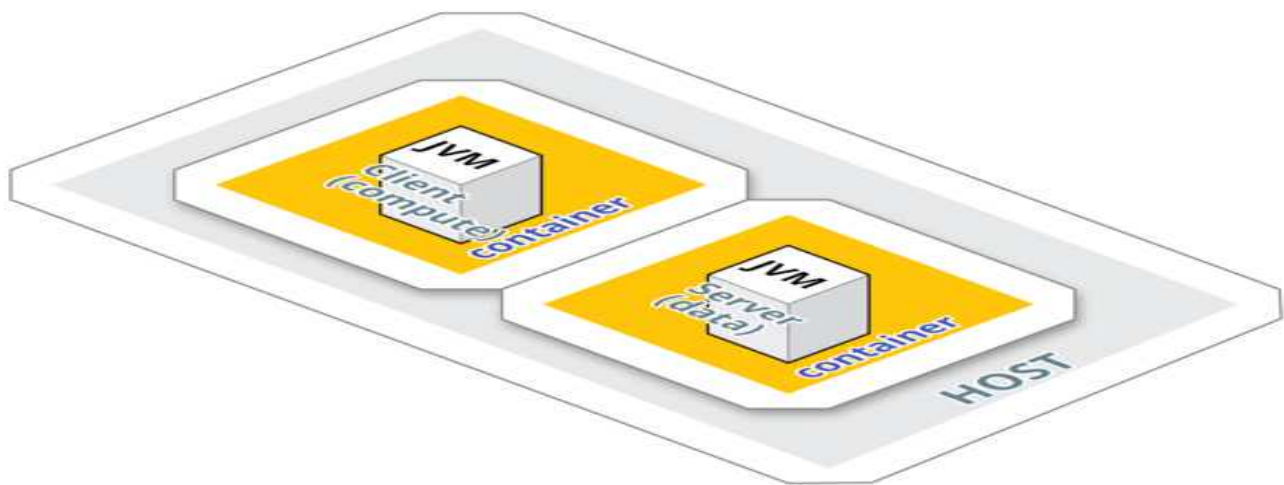




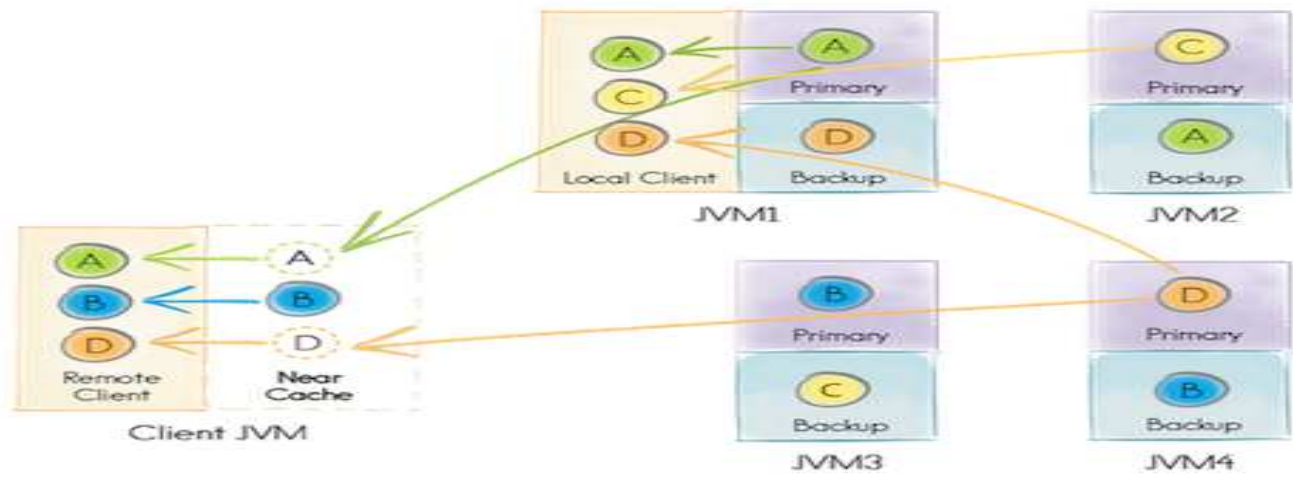


```
[18:36:05] Ignite node started OK (id=3113ed1e)
[18:36:05] Topology snapshot [ver=8, servers=1, clients=0, CPUs=8, heap=1.0GB]
[21:26:12] Topology snapshot [ver=9, servers=2, clients=0, CPUs=8, heap=4.5GB]
[21:26:13] Topology snapshot [ver=10, servers=1, clients=0, CPUs=8, heap=1.0GB]
```

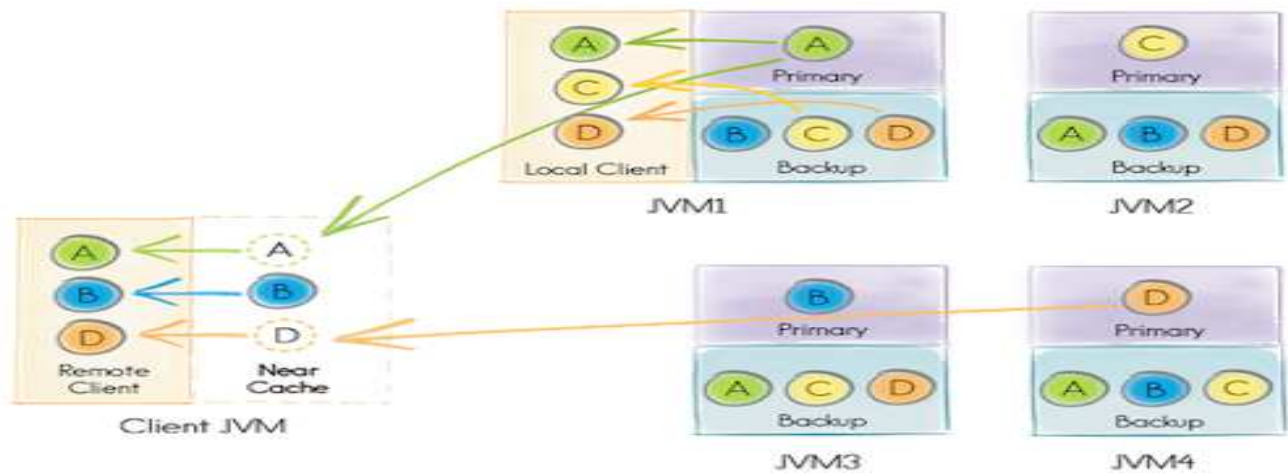


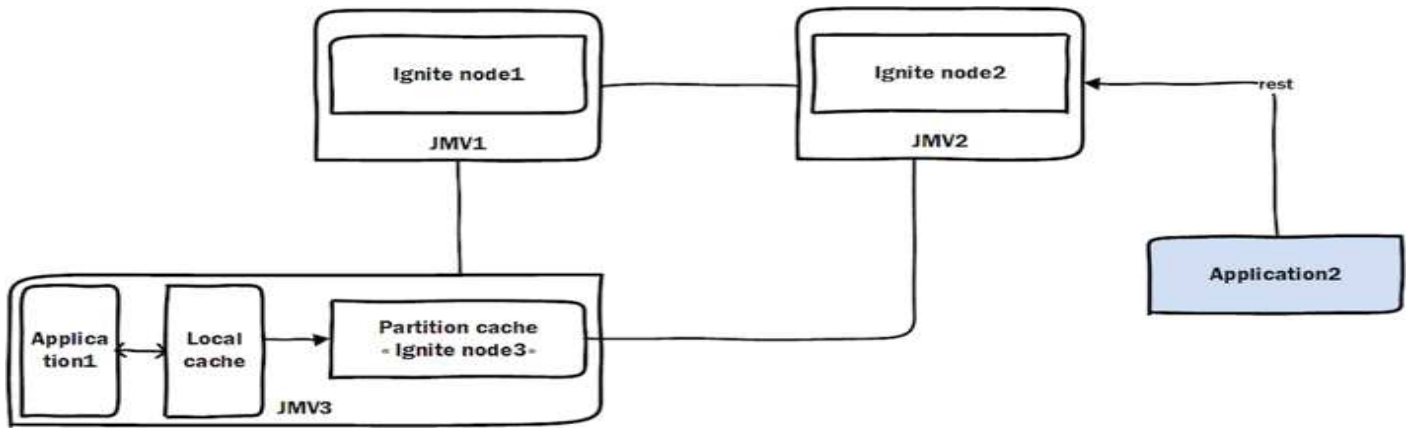


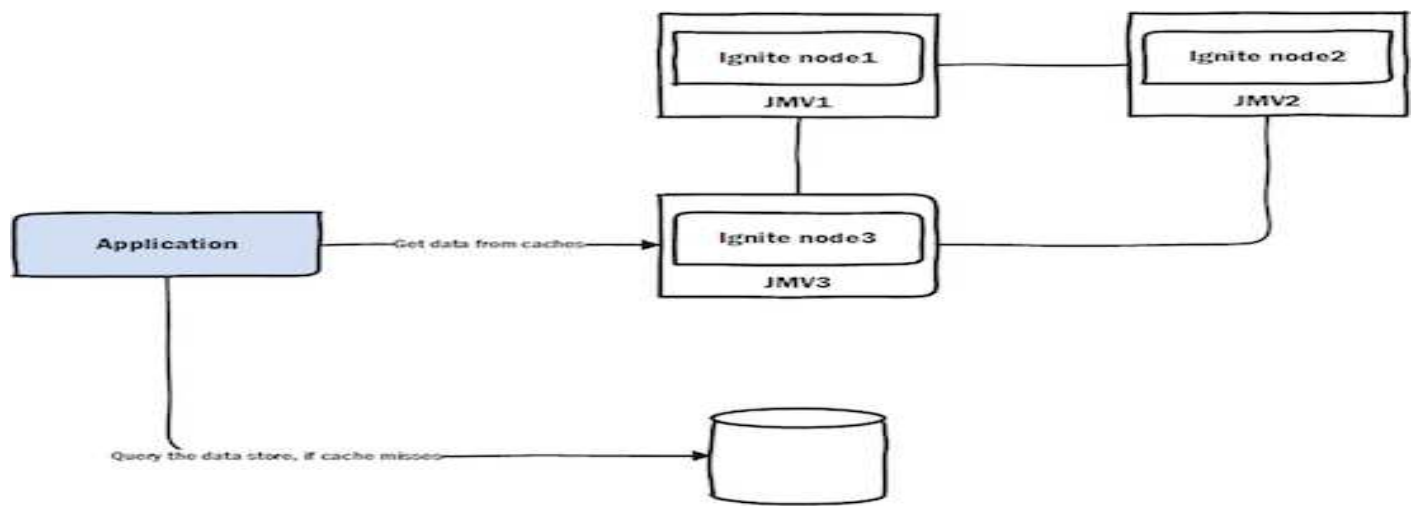
Partitioned Cache

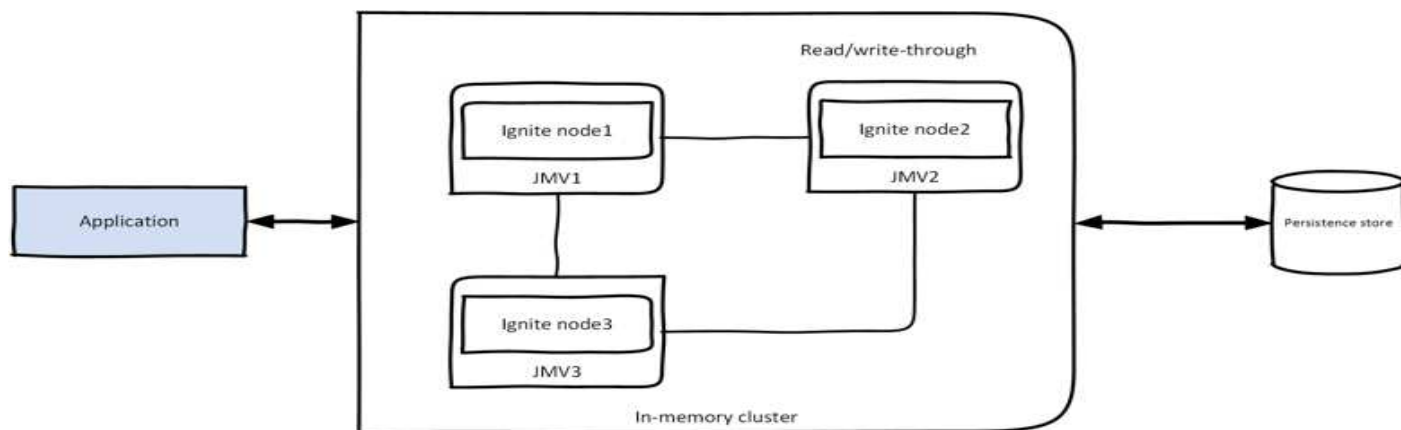


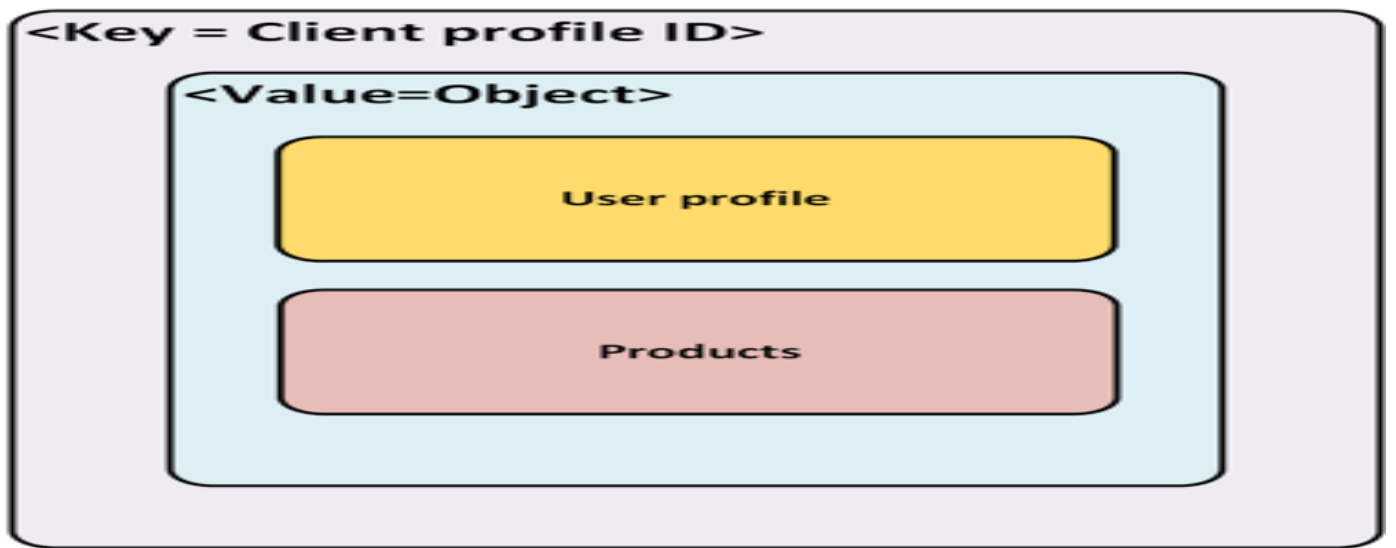
Replicated Cache

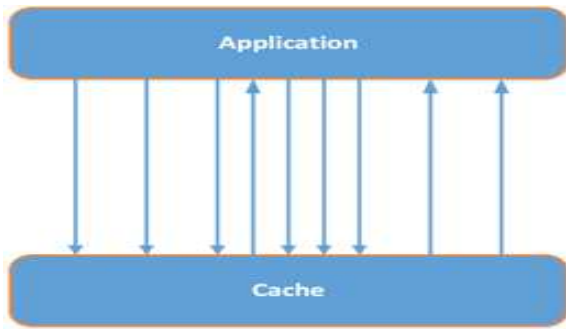




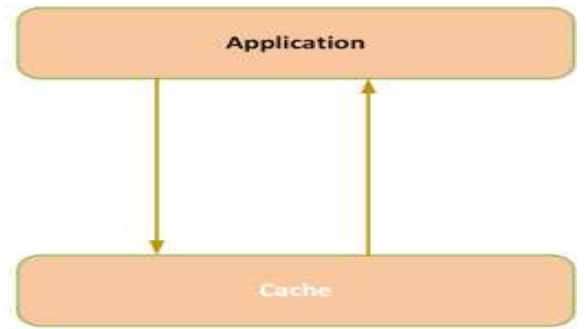








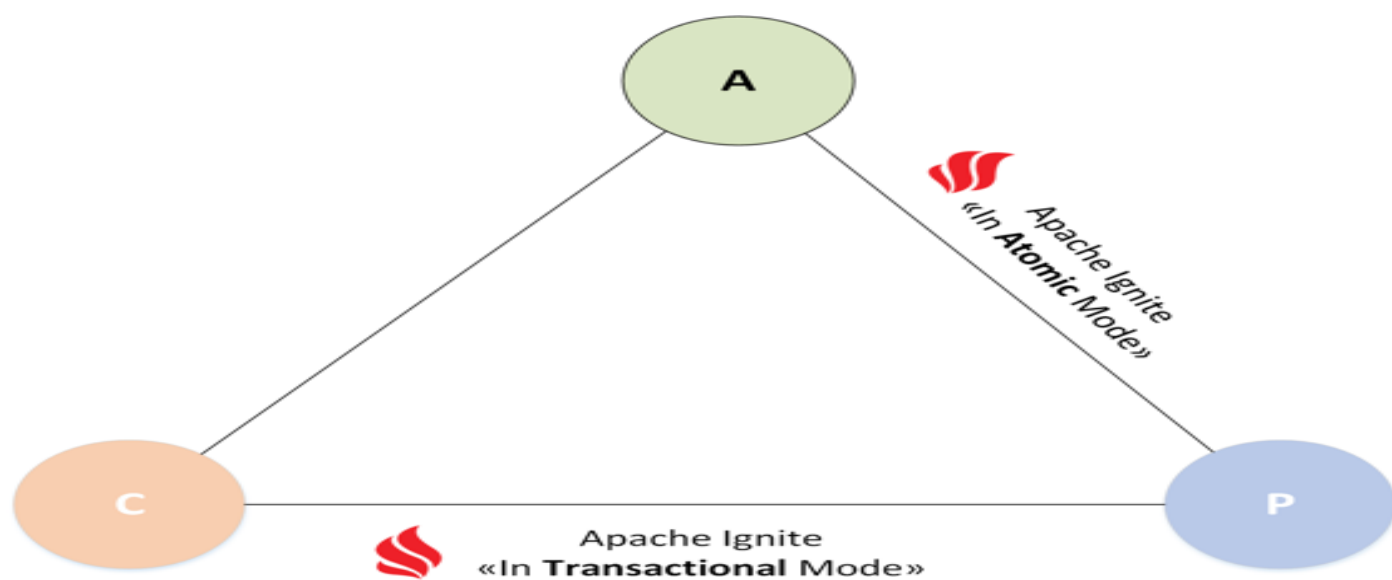
Without EntryProcessor

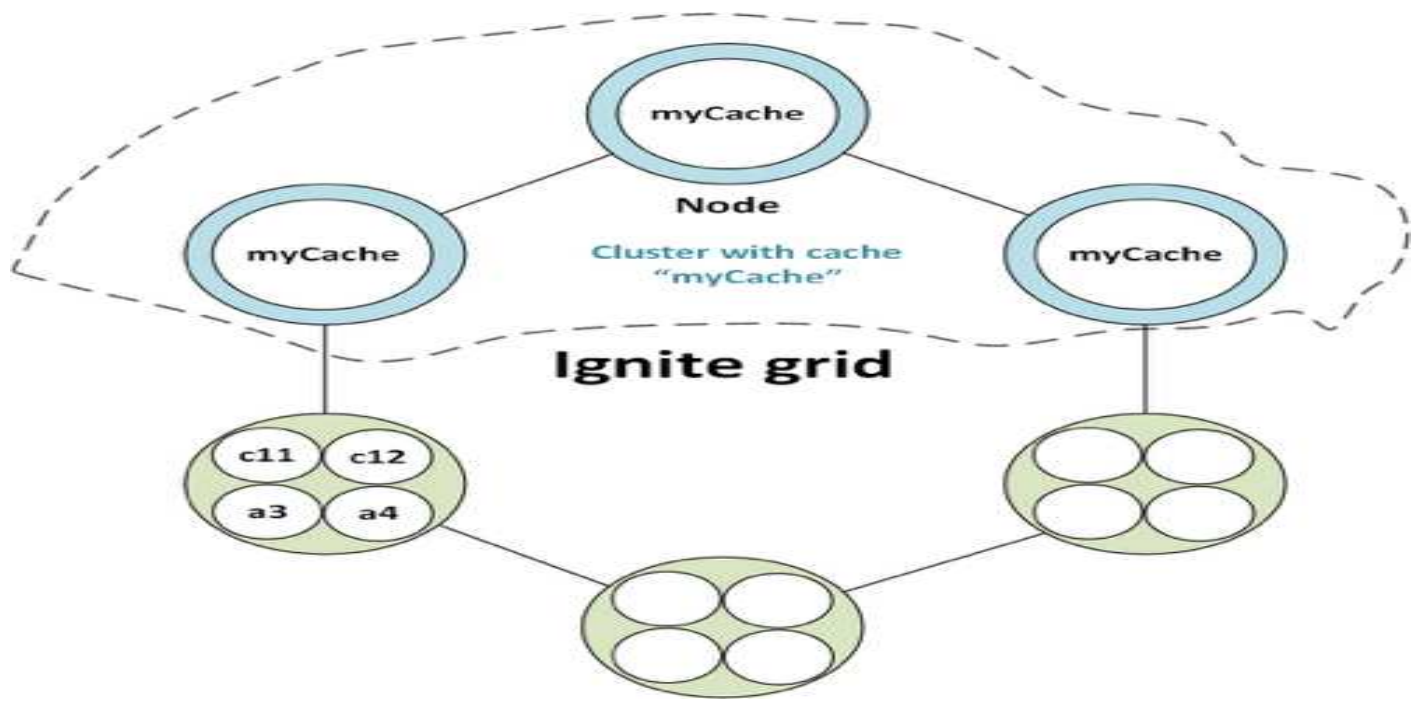


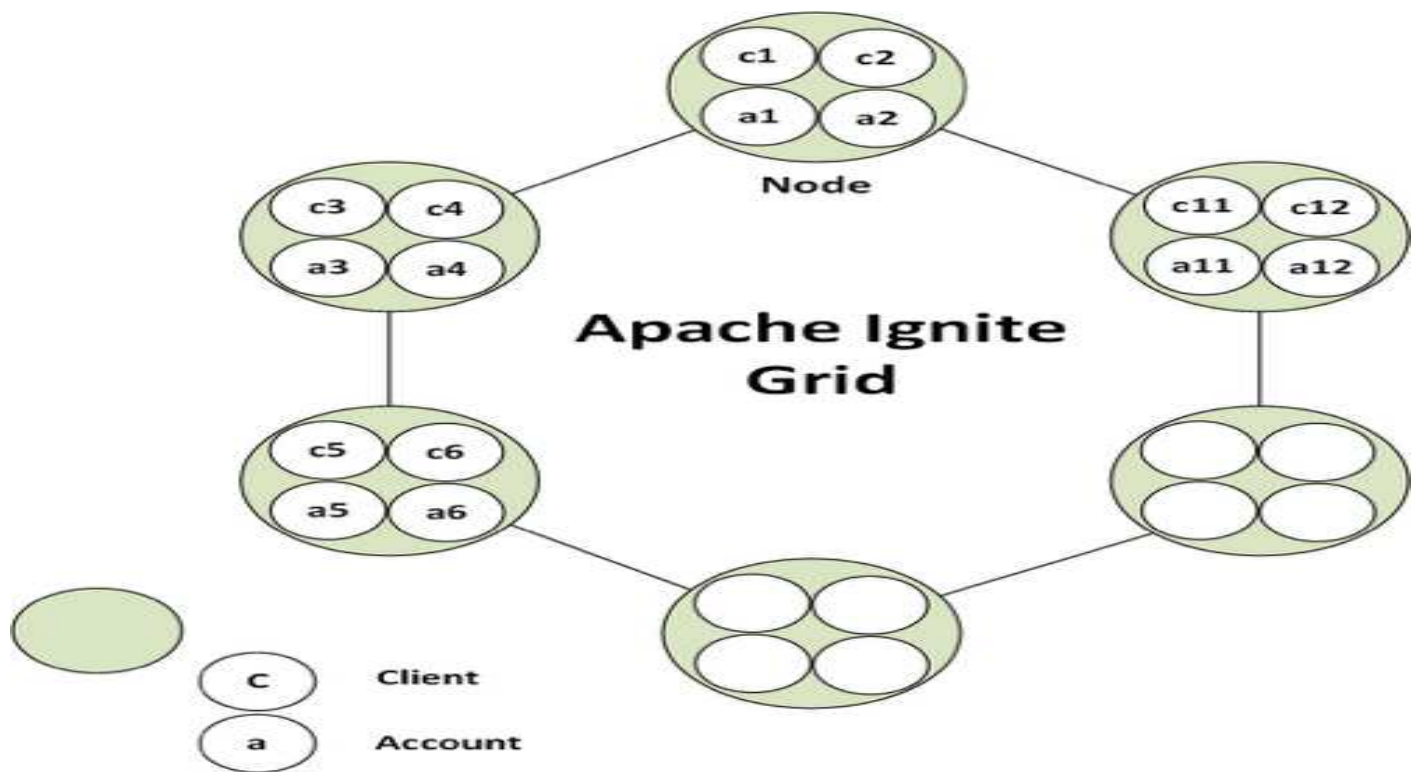
Jcache EntryProcessor

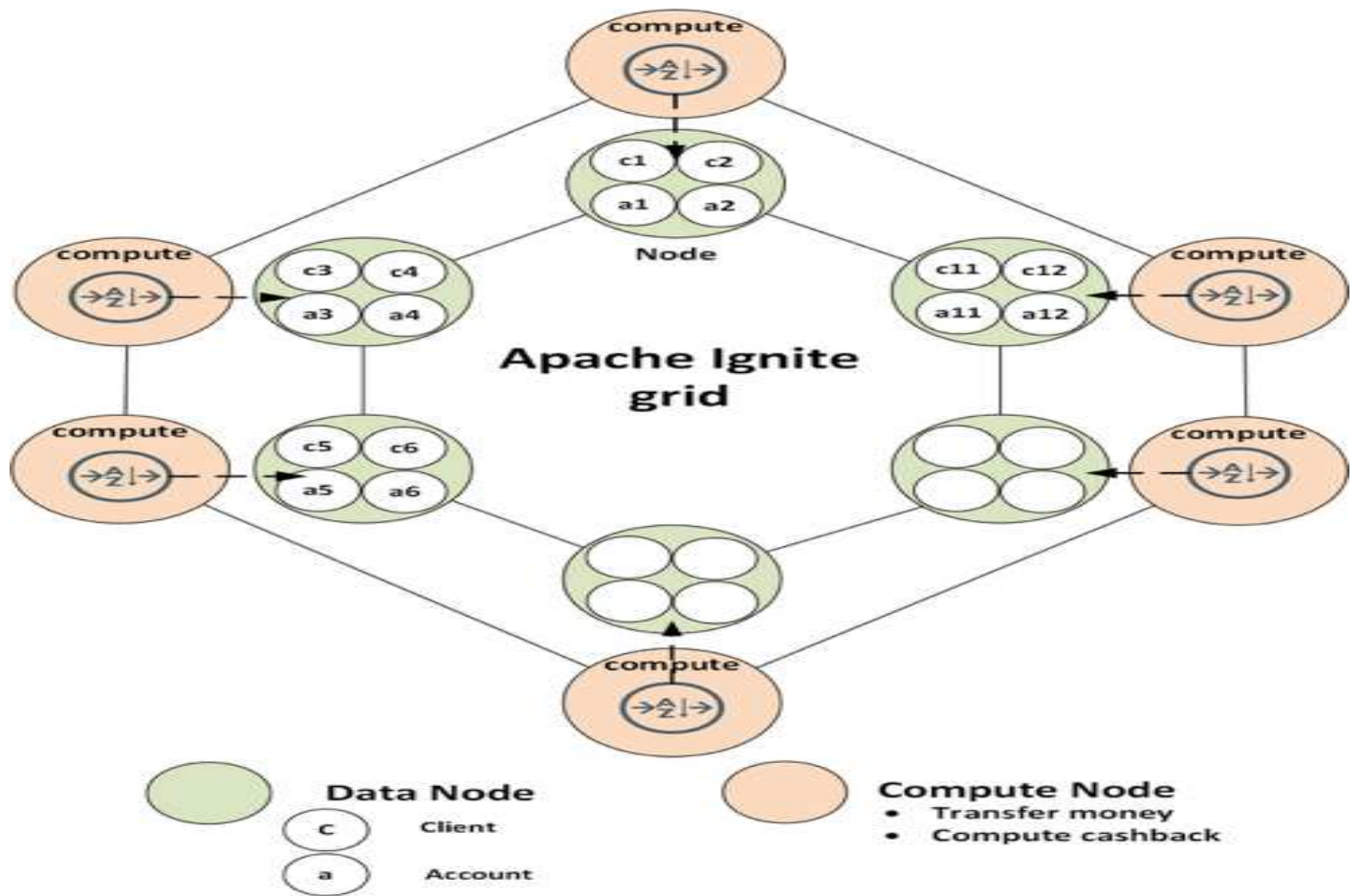
Visual Guide to NoSQL Systems

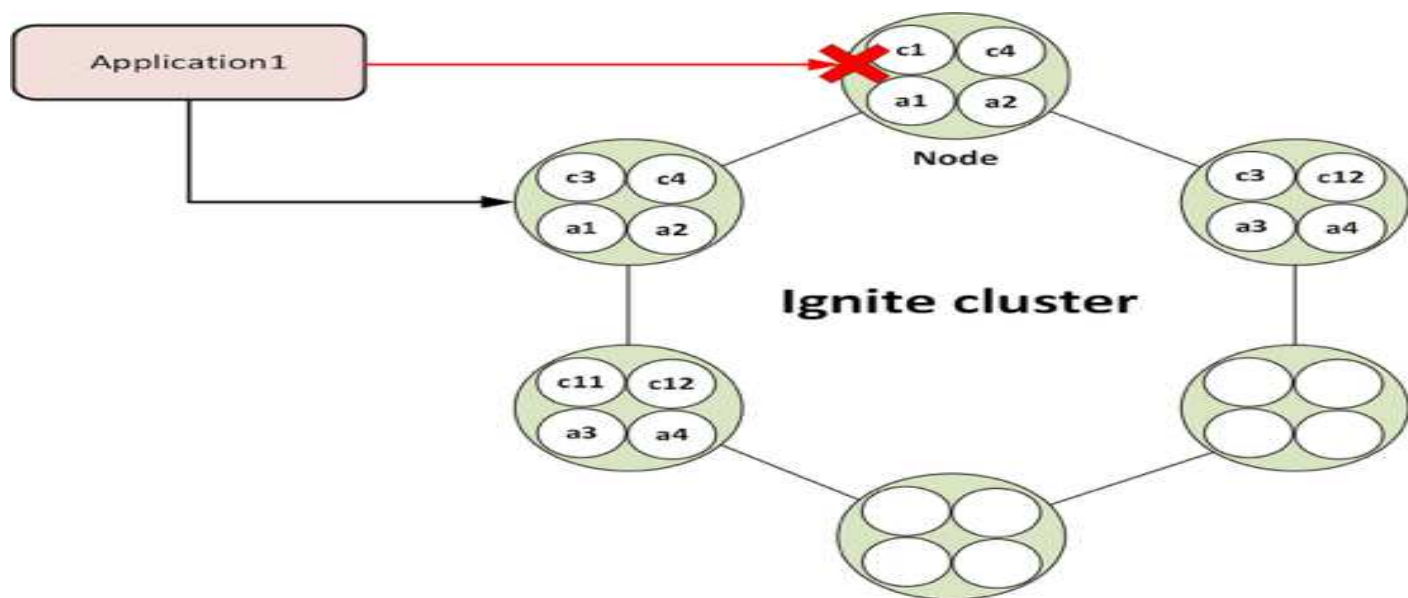


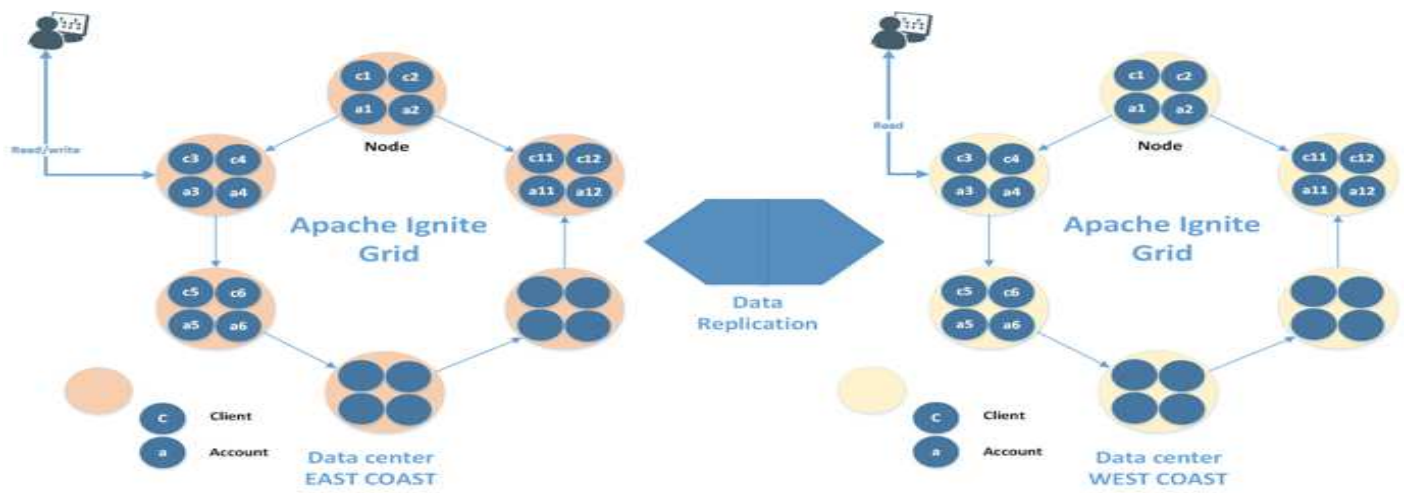


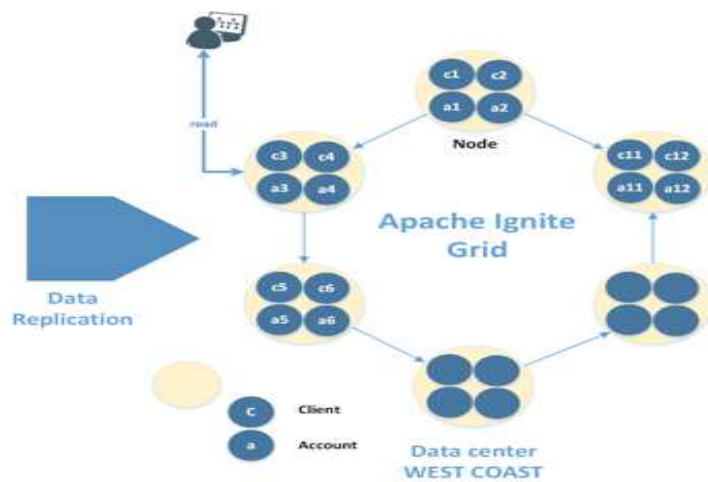
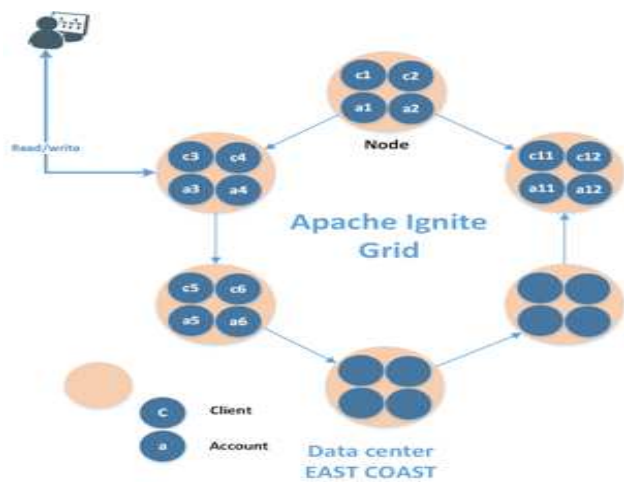


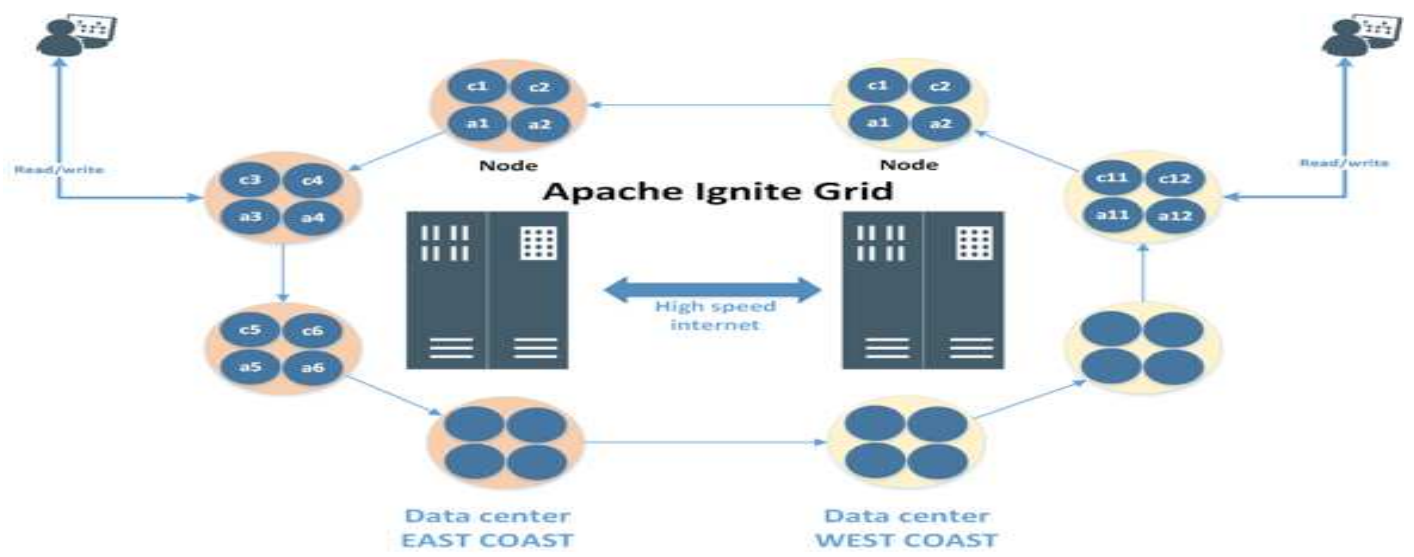


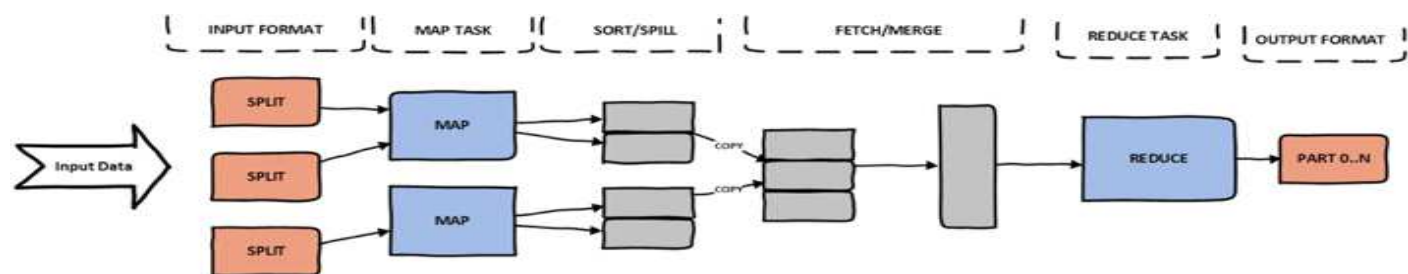
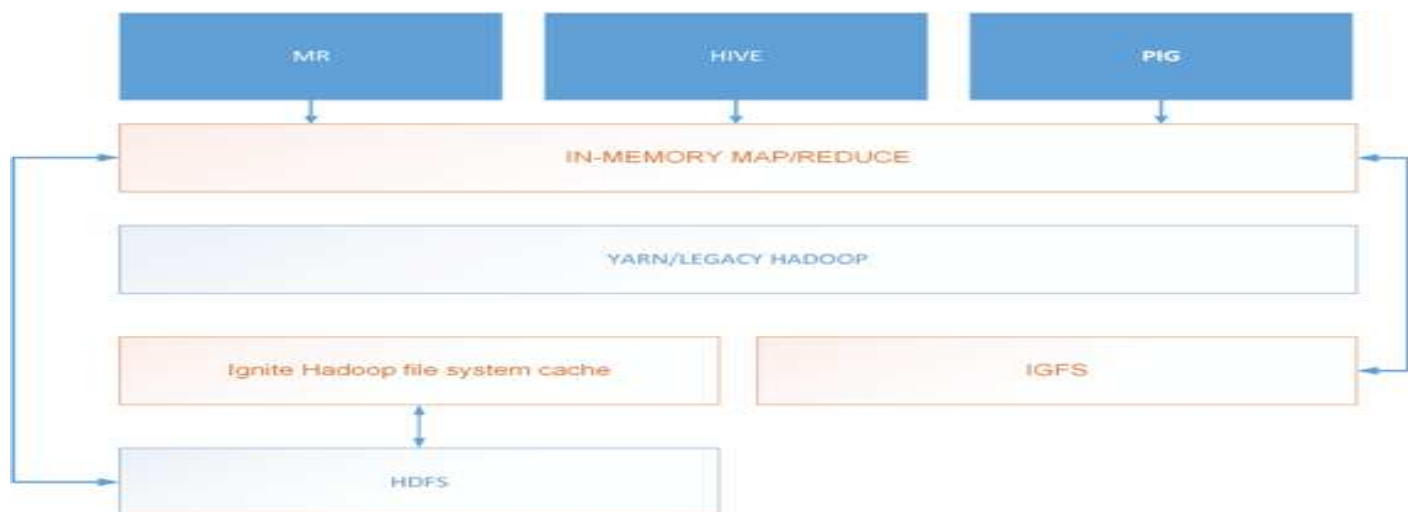


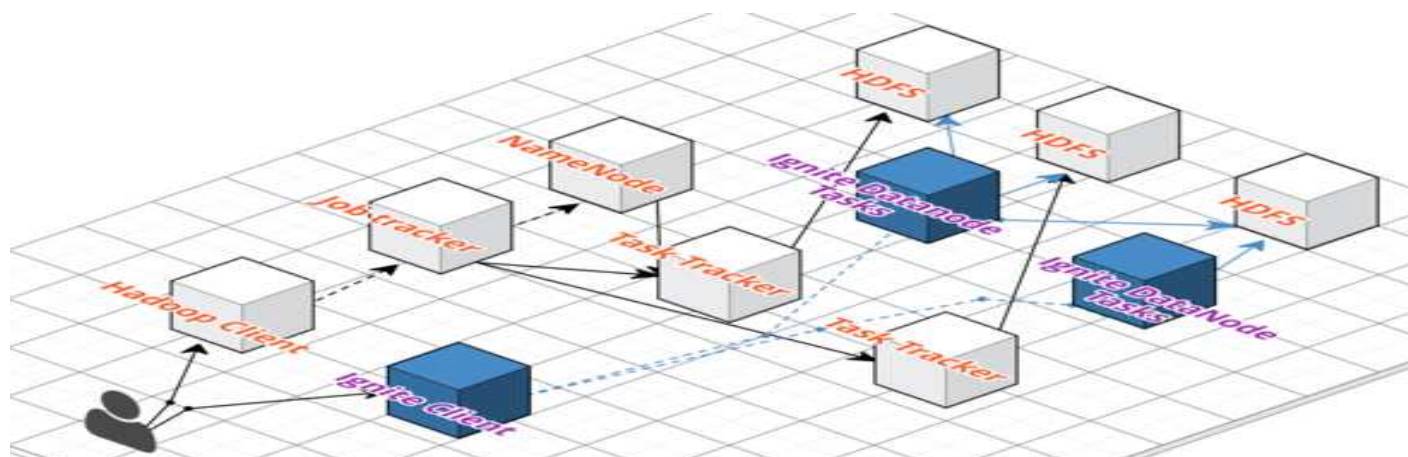















```
May 30, 2016 12:21:40 PM org.apache.ignite.internal.client.impl.connection.GridClientNioTcpConnection <init>
INFO: Client TCP connection established: localhost/127.0.0.1:11211
May 30, 2016 12:21:40 PM org.apache.ignite.internal.client.impl.GridClientImpl <init>
INFO: Client started [id=4ce54600-c8c4-43cf-9e22-d6b3813c2cdd, protocol=TCP]
16/05/30 12:21:42 INFO input.FileInputFormat: Total input paths to process : 32
16/05/30 12:21:43 INFO mapreduce.JobSubmitter: number of splits:32
16/05/30 12:21:44 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_92f230ed-adf0-4457-a16f-e853272fb88f_0003
16/05/30 12:21:44 INFO mapreduce.Job: The url to track the job: N/A
16/05/30 12:21:44 INFO mapreduce.Job: Running job: job_92f230ed-adf0-4457-a16f-e853272fb88f_0003
16/05/30 12:21:45 INFO mapreduce.Job: Job job_92f230ed-adf0-4457-a16f-e853272fb88f_0003 running in uber mode : false
16/05/30 12:21:45 INFO mapreduce.Job: map 0% reduce 0%
16/05/30 12:21:51 INFO mapreduce.Job: map 6% reduce 0%
16/05/30 12:21:52 INFO mapreduce.Job: map 25% reduce 0%
16/05/30 12:21:54 INFO mapreduce.Job: map 63% reduce 0%
16/05/30 12:21:55 INFO mapreduce.Job: map 100% reduce 0%
16/05/30 12:21:56 INFO mapreduce.Job: map 100% reduce 100%
16/05/30 12:21:56 INFO mapreduce.Job: Job job_92f230ed-adf0-4457-a16f-e853272fb88f_0003 completed successfully
16/05/30 12:21:56 INFO mapreduce.Job: Counters: 0
```

```
visor> tasks -l -t=15m
Tasks: 4
```

Task Name(@ID), Oldest/Latest & Rate	Duration	Nodes	Executions
HadoopProtocolJobCountersTask(@t0)	min: 00:00:00:000 avg: 00:00:00:000 max: 00:00:00:000	min: 1 avg: 1 max: 1	Total: 1 St: 0 (0%) Fi: 1 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 05/30/16, 12:21:56 Latest: 05/30/16, 12:21:56			
Exec. Rate: 1 in 00:00:00:000			
HadoopProtocolJobStatusTask(@t1)	min: 00:00:00:000 avg: 00:00:00:156 max: 00:00:01:531	min: 1 avg: 1 max: 1	Total: 24 St: 0 (0%) Fi: 24 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 05/30/16, 12:21:44 Latest: 05/30/16, 12:21:56			
Exec. Rate: 24 in 00:00:12:508			
HadoopProtocolNextTaskIdTask(@t2)	min: 00:00:00:010 avg: 00:00:00:010 max: 00:00:00:010	min: 1 avg: 1 max: 1	Total: 1 St: 0 (0%) Fi: 1 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 05/30/16, 12:21:41 Latest: 05/30/16, 12:21:41			
Exec. Rate: 1 in 00:00:00:010			
HadoopProtocolSubmitJobTask(@t3)	min: 00:00:00:214 avg: 00:00:00:214 max: 00:00:00:214	min: 1 avg: 1 max: 1	Total: 1 St: 0 (0%) Fi: 1 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 05/30/16, 12:21:44 Latest: 05/30/16, 12:21:44			
Exec. Rate: 1 in 00:00:00:214			

```
*St* - Started tasks.
*Fi* - Finished tasks.
*Fa* - Failed tasks.
*Un* - Undefined tasks (originating node left topology).
*Ti* - Timed out tasks.
```

```

Sep 05, 2016 4:14:40 PM org.apache.ignite.internal.client.impl.connection.GridClientNioTcpConnection <init>
INFO: Client TCP connection established: localhost/127.0.0.1:11211
Sep 05, 2016 4:14:40 PM org.apache.ignite.internal.client.impl.GridClientImpl <init>
INFO: Client started [id=5e67618e-a44d-416a-bc8c-a476af48723c, protocol=TCP]
16/09/05 16:14:41 INFO input.FileInputFormat: Total input paths to process : 2
16/09/05 16:14:41 INFO mapreduce.JobSubmitter: number of splits:2
16/09/05 16:14:42 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0003
16/09/05 16:14:42 INFO mapreduce.Job: The url to track the job: N/A
16/09/05 16:14:42 INFO mapreduce.Job: Running job: job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0003
16/09/05 16:14:43 INFO mapreduce.Job: Job job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0003 running in uber mode : false
16/09/05 16:14:43 INFO mapreduce.Job: map 0% reduce 0%
16/09/05 16:14:48 INFO mapreduce.Job: map 50% reduce 0%
16/09/05 16:14:49 INFO mapreduce.Job: map 100% reduce 0%
16/09/05 16:14:49 INFO mapreduce.Job: map 100% reduce 100%
16/09/05 16:14:49 INFO mapreduce.Job: Job job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0003 completed successfully
16/09/05 16:14:49 INFO mapreduce.Job: Counters: 0

real    0m12.432s
user    0m5.857s
sys     0m0.180s

```

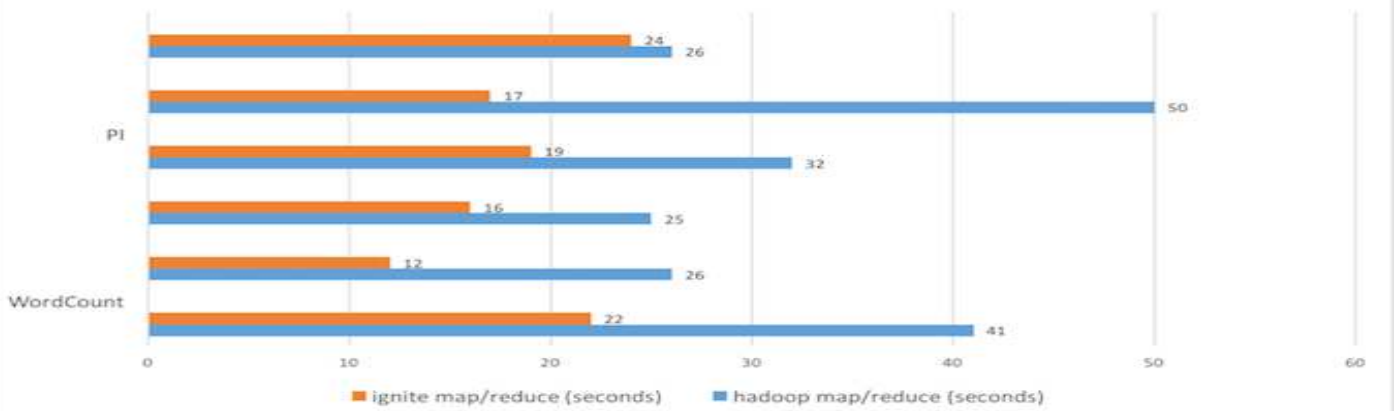
```

Sep 05, 2016 4:21:39 PM org.apache.ignite.internal.client.impl.connection.GridClientNioTcpConnection <init>
INFO: Client TCP connection established: localhost/127.0.0.1:11211
Sep 05, 2016 4:21:39 PM org.apache.ignite.internal.client.impl.GridClientImpl <init>
INFO: Client started [id=d011a8e1-8a96-4af4-afc6-baa7ca6f04be, protocol=TCP]
16/09/05 16:21:39 INFO input.FileInputFormat: Total input paths to process : 16
16/09/05 16:21:40 INFO mapreduce.JobSubmitter: number of splits:16
16/09/05 16:21:40 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0005
16/09/05 16:21:41 INFO mapreduce.Job: The url to track the job: N/A
16/09/05 16:21:41 INFO mapreduce.Job: Running job: job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0005
16/09/05 16:21:42 INFO mapreduce.Job: Job job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0005 running in uber mode : false
16/09/05 16:21:42 INFO mapreduce.Job: map 0% reduce 0%
16/09/05 16:21:46 INFO mapreduce.Job: map 31% reduce 0%
16/09/05 16:21:47 INFO mapreduce.Job: map 100% reduce 0%
16/09/05 16:21:50 INFO mapreduce.Job: map 100% reduce 100%
16/09/05 16:21:50 INFO mapreduce.Job: Job job_b3123b9a-34e2-44eb-af5c-87633590e8f5_0005 completed successfully
16/09/05 16:21:50 INFO mapreduce.Job: Counters: 0
Job Finished in 11.013 seconds
Estimated value of Pi is 3.141591250000000000000000

real    0m17.814s
user    0m6.349s
sys     0m0.246s

```

Benchmark of example WordCount and PI



```
(user@ec2-54-93:~$ ./pi pig
16/09/06 12:31:33 INFO pig.ExecTypeProvider: Trying ExecType : LOCAL
16/09/06 12:31:33 INFO pig.ExecTypeProvider: Trying ExecType : MAPREDUCE
16/09/06 12:31:33 INFO pig.ExecTypeProvider: Picked MAPREDUCE as the ExecType
2016-09-06 12:31:32.001 [main] INFO org.apache.pig.Main - Apache Pig version 0.16.0 (r1746538) compiled Jun 01 2016, 23:18:49
2016-09-06 12:31:32.002 [main] INFO org.apache.pig.Main - Logging error messages to: /home/user/pig-1473154291099.log
2016-09-06 12:31:33.025 [main] INFO org.apache.pig.Main - Default bootstrap file: /home/user/pig-bootstrap not found
2016-09-06 12:31:33.343 [main] WARN org.apache.hadoop.util.NativeCodeLoader - Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
2016-09-06 12:31:33.481 [main] INFO org.apache.hadoop.conf.Configuration.deprecation - mapred.job.tracker is deprecated. Instead, use mapreduce.jobtracker.address
2016-09-06 12:31:33.481 [main] INFO org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instead, use fs.defaultFS
2016-09-06 12:31:33.482 [main] INFO org.apache.pig.backend.hadoop.executionengine.ExecutionEngine - Connecting to hadoop file system at: hdfs://localhost:9000
2016-09-06 12:31:34.083 [main] INFO org.apache.pig.backend.hadoop.executionengine.ExecutionEngine - Connecting to map-reduce job tracker at: localhost:11231
2016-09-06 12:31:34.116 [main] INFO org.apache.pig.PigServer - Pig Script ID for the session: PIG-default-bcb4462-206-4134-pif1-1d3eedb299
2016-09-06 12:31:34.116 [main] WARN org.apache.pig.PigServer - ATS is disabled since yarn.timeline-service.enabled set to false
```

```

2016-09-06 16:02:03.774 [main] WARN mapreduce.Counters - Group org.apache.hadoop.mapred.TaskCounter is deprecated, use org.apache.hadoop.mapreduce.TaskCounter instead
2016-09-06 16:02:03.777 [main] INFO org.apache.pig.backend.hadoop.executionengine.mapreduceLayer.MapReduceLauncher - 3006 complete
2016-09-06 16:02:03.813 [main] INFO org.apache.pig.tools.pigstats.mapreduce.SimplePigStats - Script Statistics:

HadoopVersion:  PigVersion:  User:Id:  StartedAt:  FinishedAt:  Features:
2.7.2  0.16.0  user  2016-09-06 16:01:28  2016-09-06 16:02:03  GROUP_BY,LDIST

Successful

Job Stats (time in seconds):
JobId  Name  Reduces  MapMapTime  MRMapTime  AvgMapTime  RedLocMapTime  RedReduceTime  MRReduceTime  AvgReduceTime  RedLocReduceTime  Alias  Feature  Outputs
Job_52e5309b-dad8-4a06-8213-e1968d354a62_0001  1  1  n/a  n/a  n/a  n/a  n/a  n/a  n/a  A,B,C,D,E  GROUP_BY,COMBINE
Job_52e5309b-dad8-4a06-8213-e1968d354a62_0002  1  1  n/a  n/a  n/a  n/a  n/a  n/a  D  hdfs://localhost:9000/tmp/temp-222484135/tmp958422378

Input(s):
Successfully read 0 records from: "/wc-input/18.shakespeare.txt"

Output(s):
Successfully stored 0 records to: "hdfs://localhost:9000/tmp/temp-222484135/tmp958422378"

Counters:
Total records written : 0
Total bytes written : 0
Spillable Memory Manager spill count : 0
Total logs proactively spilled: 0
Total records proactively spilled: 0

Job DAG:
Job_52e5309b-dad8-4a06-8213-e1968d354a62_0001  ->  Job_52e5309b-dad8-4a06-8213-e1968d354a62_0002,
Job_52e5309b-dad8-4a06-8213-e1968d354a62_0002

2016-09-06 16:02:04.367 [main] INFO org.apache.pig.backend.hadoop.executionengine.mapreduceLayer.MapReduceLauncher - Success!
2016-09-06 16:02:04.372 [main] INFO org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instead, use fs.defaultFS.
2016-09-06 16:02:04.373 [main] INFO org.apache.pig.data.SchemaTupleBackend - Key [pig.schemaTuple] was not set... will not generate code.
2016-09-06 16:02:04.382 [main] INFO org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2016-09-06 16:02:04.382 [main] INFO org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to process : 1
(C0,2)
(C3,4)
(C2,6C,2)
(C14,6C,2)
(C2,6C,2)
(C100,2)
(C3,"")
(C4,"")
(C2,"")

```

Task Name(@ID), Oldest/Latest & Rate	Duration	Nodes	Executions
HadoopProtocolJobCountersTask(@t0)	min: 00:00:00:000 avg: 00:00:00:002 max: 00:00:00:010	min: 1 avg: 1 max: 1	Total: 4 St: 0 (0%) Fi: 4 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 09/06/16, 16:01:51 Latest: 09/06/16, 16:02:04 Exec. Rate: 4 in 00:00:12:433			
HadoopProtocolJobStatusTask(@t1)	min: 00:00:00:000 avg: 00:00:00:058 max: 00:00:00:170	min: 1 avg: 1 max: 1	Total: 31 St: 0 (0%) Fi: 31 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 09/06/16, 16:01:36 Latest: 09/06/16, 16:02:04 Exec. Rate: 31 in 00:00:28:076			
HadoopProtocolNextTaskIdTask(@t2)	min: 00:00:00:010 avg: 00:00:00:010 max: 00:00:00:010	min: 1 avg: 1 max: 1	Total: 2 St: 0 (0%) Fi: 2 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 09/06/16, 16:01:29 Latest: 09/06/16, 16:01:52 Exec. Rate: 2 in 00:00:22:585			
HadoopProtocolSuberitJobTask(@t3)	min: 00:00:00:358 avg: 00:00:02:181 max: 00:00:04:005	min: 1 avg: 1 max: 1	Total: 2 St: 0 (0%) Fi: 2 (100%) Fa: 0 (0%) Un: 0 (0%) Ti: 0 (0%)
Oldest: 09/06/16, 16:01:32 Latest: 09/06/16, 16:01:53 Exec. Rate: 2 in 00:00:21:024			

(2,The Mummy,1932,3.5,4388)
 (321,Tale of the Mummy,1998,3.0,5290)
 (3139,The Mummy's Curse,1944,3.4,3642)
 (3140,The Mummy's Hand,1940,3.4,4007)
 (3369,Mummy Maniac,2007,1.8,4815)
 (3865,Hercules: The Legendary Journeys: Season 3: Mummy Dearest,1996,,2634)
 (4881,Amazing Stories: Season 1: Mummy Daddy,1985,,1480)
 (5133,Quincy M.E.: Season 6: Dear Mummy,1980,,2994)
 (5388,The Munsters: Season 1: Mummy Munster,1964,,1527)
 (6827,The Suite Life of Zack & Cody: Season 2: I Want My Mummy,2006,,1355)
 (10653,Bones: Season 3: Mummy in the Maze,2007,,2634)
 (11231,Buffy the Vampire Slayer: Season 2: Inca Mummy Girl,1997,,2683)
 (15819,Eureka: Season 3.0: Show Me the Mummy!,2008,,2632)
 (17571,Johnny Test: Season 4: iJohnny Johnny vs. The Mummy,2009,,1324)
 (17587,Busytown Mysteries: Series 2: The Mystery of the Mumbling Mummy The False Alarm Mystery,2010,,1443)
 (19560,Phineas and Ferb: Season 1: Are You My Mummy? Flop Starz,2008,,1352)
 (22859,Pair of Kings: Season 1: Revenge of the Mummy,2010,,1324)
 (24063,Charmed: Season 5: Y Tu Mummy Tambien,2002,,2525)
 (24135,Big Bad Beetleborgs: Season 2: The Curse of the Mummy's Mommy,1997,,1251)
 (30051,Peep Show: Series 5: Jeremy's Mummy,2008,,1461)
 (32700,Mona the Vampire: Season 1: Curse of the Mummy's Tomb Freaky the Snowman,1999,,1443)
 (39616,Oddities: Season 1: Mummy Cat,2010,,1300)
 (41483,Goosebumps: Season 1: The Return of the Mummy,1995,,1313)
 (41541,Mr. Young: Mr. Mummy,2011,,1327)
 (43253,Aqua Teen Hunger Force: Season 1: Love Mummy,2000,,682)
 (43428,The Grim Adventures of Billy & Mandy: Season 2: That's My Mummy Toys Will Be Toys,2004,,1294)
 (43512,Courage the Cowardly Dog: Season 2: Courage Meets the Mummy Invisible Muriel,2000,,1362)
 (47284,Goosebumps: Season 3: Don't Wake Mummy,1997,,1300)
 (48486,Oddities: Season 3: Mummy's Private Collection,2011,,1300)
 (49480,Casper's Scare School: Season 2: The Last Dance Mummy's Boy,2011,,1401)

```

[user@cochetedemo2 bin]$ hive-ig.sh
which: no hbase in /usr/lib64/qt-3.3/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/sbin:/home/user/pig-0.16.0/bin
ser/hadoop/hadoop-2.7.2/bin:/home/user/ignite-1.6.0/bin:/home/user/bin:/home/user/hive-2.1.0/bin)
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/user/hive-2.1.0/lib/log4j-slf4j-impl-2.4.1.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/user/hadoop/hadoop-2.7.2/share/hadoop/common/lib/slf4j-log4j12-1.7.10.jar!/org/slf4j/imp
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.apache.logging.slf4j.Log4jLoggerFactory]

Logging initialized using configuration in jar:file:/home/user/hive-2.1.0/lib/hive-common-2.1.0.jar!/hive-log4j2.properties Async
Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution engine i
X releases.
hive>
  
```

```

zodiacs 1
zone, 1
zounds! 1
zounds, 1
zwagger'd 1
} 2
Time taken: 10.557 seconds, Fetched: 67506 row(s)
hive>

```

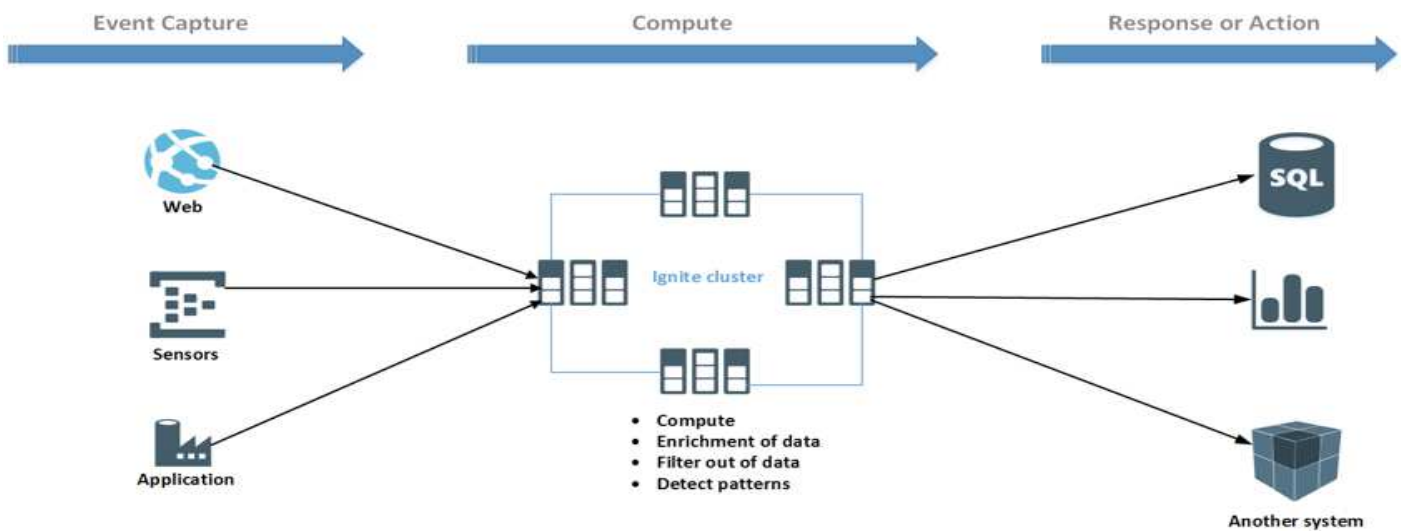
```

[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.GroupByOperator - Initializing operator GBY[9]
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - Initializing operator FS[11]
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - Using serializer : class org.apache.hadoop.hive.serde2.lazy.LazySimpleSerDe[[B@4bc35e46]:[_col0, _col1]:[string, bigint]] and formatter : org.apache.hadoop.hive.q1.io.HiveSequenceFileOutputFormat@682e1ef0
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - Final Path: FS lgfs:/tmp/hive/user/43d81cb1-cdde-4d45-8fc6-053cc819b0ed/hive_2016-09-13_22-50-37_889_3076915161674796929-1/-mr-10000/.hive-staging_hive_2016-09-13_22-50-37_889_3076915161674796929-1/_tmp_--ext-10001/0000000_0
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - Writing to temp file: FS lgfs:/tmp/hive/user/43d81cb1-cdde-4d45-8fc6-053cc819b0ed/hive_2016-09-13_22-50-37_889_3076915161674796929-1/-mr-10000/.hive-staging_hive_2016-09-13_22-50-37_889_3076915161674796929-1/_task_tmp_--ext-10001/_tmp_0000000_0
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - New Final Path: FS lgfs:/tmp/hive/user/43d81cb1-cdde-4d45-8fc6-053cc819b0ed/hive_2016-09-13_22-50-37_889_3076915161674796929-1/-mr-10000/.hive-staging_hive_2016-09-13_22-50-37_889_3076915161674796929-1/_tmp_--ext-10001/0000000_0
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 1
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 10
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 100
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 1000
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 10000
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - FS[11]: records written - 67506
[Hadoop-task-2c841fd2-d178-402f-9be3-8f821524f4f3_2-REDUCE-0-0-#89#null%] INFO org.apache.hadoop.hive.q1.exec.FileSinkOperator - RECORDS_OUT_0:67506,

```



```
2005      1937
2006      2416
2007      2892
2008      3358
2009      4451
2010      5107
2011      5511
2012      4339
2013      981
2014       1
Time taken: 9.045 seconds, Fetched: 101 row(s)
```



TUPLES

ordered list of elements

(`"bion@at-consulting.ru"`, `"ignite-demo@ignite.com"`)

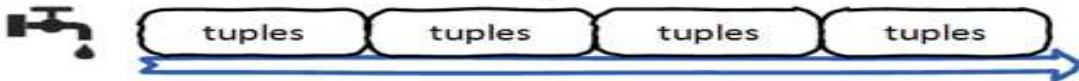
STREAMS

unbound and un ordered sequence of tuples



SPOUTS

Source of streams

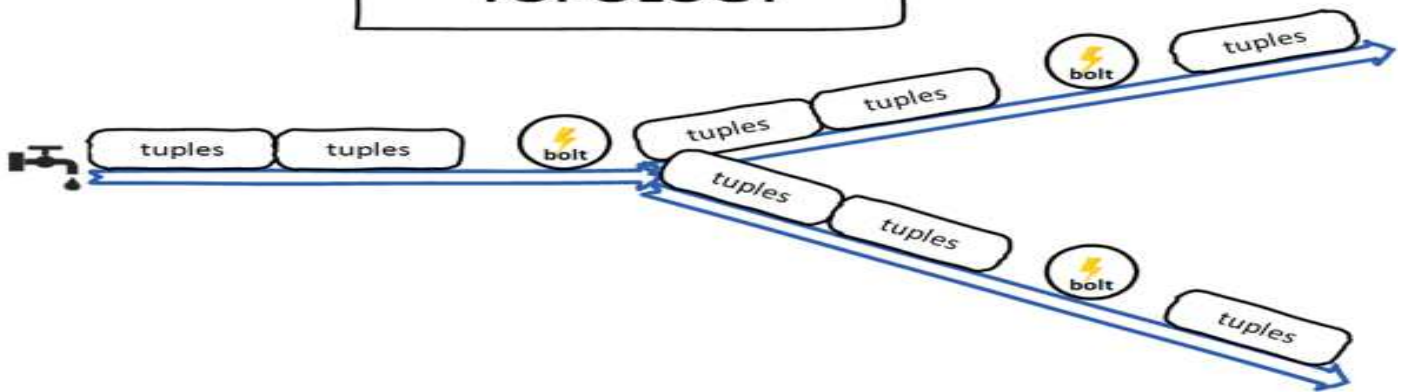


BOLTS

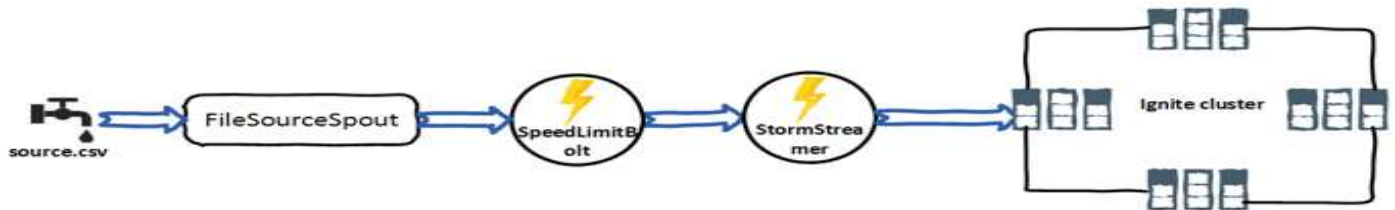
Process tuples and create new streams



TOPOLOGY



Speed violation topology



```

16886 [Thread-12-limit] INFO c.b.i.s.b.SpeedLimitBolt - Speed violation found:BC 123 speed:170
16886 [Thread-12-limit] INFO b.s.util - Async loop interrupted!
16886 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shut down executor limit:[3 3]
16886 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shutting down executor __acker:[1 1]
16886 [Thread-13-disruptor-executor[1 1]-send-queue] INFO b.s.util - Async loop interrupted!
16886 [Thread-14-__acker] INFO b.s.util - Async loop interrupted!
16893 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shut down executor __acker:[1 1]
16893 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shutting down executor __system:[-1 -1]
16893 [Thread-16-__system] INFO b.s.util - Async loop interrupted!
16893 [Thread-15-disruptor-executor[-1 -1]-send-queue] INFO b.s.util - Async loop interrupted!
16894 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shut down executor __system:[-1 -1]
16894 [com.blu.imdg.storm.topology.SpeedViolationTopology.main()] INFO b.s.d.executor - Shutting down executor spout:[4 4]
16895 [Thread-18-spout] INFO b.s.util - Async loop interrupted!
  
```

Entries in cache: testCache

Key Class	Key	Value Class	Value
java.lang.String	AB 123	java.lang.Integer	160
java.lang.String	BC 123	java.lang.Integer	170
java.lang.String	EF 123	java.lang.Integer	190
java.lang.String	GH 123	java.lang.Integer	150
java.lang.String	PO 234	java.lang.Integer	140