Description: This document is for building userlevel-click vids with RAMCloud client

RAMCloud

Install dependencies

```
# install jdk8 for zookeeper
apt-get install software-properties-common
sudo apt-add-repository ppa:webupd8team/java
sudo apt-get update
sudo apt-get install oracle-java8-installer

# install dependency libraries
sudo apt-get install protobuf-compiler libprotobuf-dev libpcre++-dev libzookeeper-mt-dev
libboost-program-options-dev libboost-filesystem-dev libboost-system-dev libssl-dev zookeeper

# Maybe you need to create soft links for libcrypto.so and libssl.so
```

build and install RAMCloud

参考：

https://ramcloud.atlassian.net/wiki/spaces/RAM/pages/6848614/General+Information+for+Developers

For the experiment, we change a little bit in the source code. Only little changes in source code.
https://github.com/Feng23/RAMCloud

```
# install ramcloud to /usr/local
sudo make -f GNUmakefile -j $(getconf _NPROCESSORS_ONLN) DEBUG=no install INSTALL_DIapt-
gR=/usr/local
# This will install headers to /usr/local/include/ramcloud and install share library to
/usr/local/lib/ramcloud
```

```
# make sure that the libramcloud.so can be found by linker
sudo echo /usr/local/lib/ramcloud/ > /etc/ld.so.conf.d/ramcloud.conf

sudo ldconfig
# The command will show you libramcloud.so if you installed it in the right way
ldconfig -p | grep ramcloud
```

Start services

参考：
https://ramcloud.atlassian.net/wiki/spaces/RAM/pages/6848532/Setting+Up+a+RAMCloud+Cluster

```
# start zookeeper
make -f GNUmakefile startZoo

# start coordinator
obj.master/coordinator -C tcp:host=$(hostname -s),port=11100 -x zk:$(hostname -s):2181 -l 1 > logs/con.log &

# start server
obj.master/server -L tcp:host=`hostname -s`,port=11101 -x zk:`hostname -s`:2181 --totalMasterMemory 16000 -l 1 > logs/ser.log &
```

RamCould Client

https://ramcloud.atlassian.net/wiki/spaces/RAM/pages/6848542/Creating+a+RAMCloud+Client

Since you already installed the ramcloud, you can build a client binary
g++ -std=c++11 src/TestClient.cc -L /usr/local/lib/ramcloud -lramcloud

Click userlevel

Ls
Vim
https://bitbucket.org/hongdal/click/src/bce23fe4454c1c6833d45288e861c1105a23e139/exps/userlevel/vids/?at=vids

Userlevel experiment results

Lightweight and Heavyweight are in the same instance
https://plot.ly/~FengLiu/1/

Experiment environment:

Platform: cloudlab

Profile: RAMCloud

Profile detail: two hosts located in wisc site and clemson site, and connected with GRE Tunnel link type

Environment measurement result:
Measurement tool: iperf

TCP:

```
# Server side
Jinrui@node-0:~$ iperf -s
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
------------------------------------------------------------
[  4] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44853
[ ID] Interval       Transfer     Bandwidth
[  4]  0.0-10.0 sec   403 MBytes   337 Mbits/sec
[  5] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44854
[  5]  0.0-10.0 sec   446 MBytes   373 Mbits/sec
[  4] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44855
[  4]  0.0-10.0 sec   467 MBytes   390 Mbits/sec
[  5] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44856
[  5]  0.0-10.1 sec   398 MBytes   332 Mbits/sec
[  4] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44857
[  4]  0.0-10.0 sec   428 MBytes   357 Mbits/sec
[  5] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44858
[  5]  0.0-10.0 sec   428 MBytes   358 Mbits/sec

# Client side
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44853 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   403 MBytes   338 Mbits/sec
Jinrui@node-1:~$ iperf -c 10.0.127.2
------------------------------------------------------------
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44854 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
```

```
[  3]  0.0-10.0 sec   446 MBytes   374 Mbits/sec
Jinrui@node-1:~$ iperf -c 10.0.127.2
------------------------------------------------------------
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44855 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   467 MBytes   392 Mbits/sec
Jinrui@node-1:~$ iperf -c 10.0.127.2
------------------------------------------------------------
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44856 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   398 MBytes   333 Mbits/sec
Jinrui@node-1:~$ iperf -c 10.0.127.2
------------------------------------------------------------
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44857 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   428 MBytes   358 Mbits/sec
Jinrui@node-1:~$ iperf -c 10.0.127.2
------------------------------------------------------------
Client connecting to 10.0.127.2, TCP port 5001
TCP window size: 85.0 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44858 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   428 MBytes   359 Mbits/sec
Jinrui@node-1:~$
```

UDP:

```
# Server side
Jinrui@node-0:~$ iperf -s -u -b 10000m
WARNING: option -b is not valid for server mode
------------------------------------------------------------
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size:  208 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 53490
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[  3]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.055 ms  301/689455 (0.044%)
[  3]  0.0-10.0 sec  1 datagrams received out-of-order
[  4] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 44614
[  4]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.048 ms  211/689348 (0.031%)
[  4]  0.0-10.0 sec  1 datagrams received out-of-order
[  3] local 10.0.127.2 port 5001 connected with 10.0.127.1 port 54730
```

```
[  3]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.023 ms  191/689304 (0.028%)
[  3]  0.0-10.0 sec  1 datagrams received out-of-order

# Client side
Jinrui@node-1:~$ iperf -c 10.0.127.2 -u -b 10000m
------------------------------------------------------------
Client connecting to 10.0.127.2, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size:  208 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 53490 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   967 MBytes   811 Mbits/sec
[  3] Sent 689456 datagrams
[  3] Server Report:
[  3]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.054 ms  301/689455 (0.044%)
[  3]  0.0-10.0 sec  1 datagrams received out-of-order
Jinrui@node-1:~$ iperf -c 10.0.127.2 -u -b 10000m
------------------------------------------------------------
Client connecting to 10.0.127.2, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size:  208 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 44614 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   966 MBytes   811 Mbits/sec
[  3] Sent 689349 datagrams
[  3] Server Report:
[  3]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.048 ms  211/689348 (0.031%)
[  3]  0.0-10.0 sec  1 datagrams received out-of-order
Jinrui@node-1:~$ iperf -c 10.0.127.2 -u -b 10000m
------------------------------------------------------------
Client connecting to 10.0.127.2, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size:  208 KByte (default)
------------------------------------------------------------
[  3] local 10.0.127.1 port 54730 connected with 10.0.127.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   966 MBytes   811 Mbits/sec
[  3] Sent 689305 datagrams
[  3] Server Report:
[  3]  0.0-10.0 sec   966 MBytes   810 Mbits/sec   0.023 ms  191/689304 (0.028%)
[  3]  0.0-10.0 sec  1 datagrams received out-of-order
Jinrui@node-1:~$
```