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The Underlying Technology of Messages

By Kannan Muthukkaruppan on Monday, November 15, 2010 at 12:46pm



We're [launching a new version of Messages](#) today that combines chat, SMS, email, and Messages into a real-time conversation. The product team spent the last year building out a robust, scalable infrastructure. As we launch the product, we wanted to share some details about the technology.

The current Messages infrastructure handles over 350 million users sending over 15 billion person-to-person messages per month. Our chat service supports over 300 million users who send over 120 billion messages per month. By monitoring usage, two general data patterns emerged:

1. A short set of temporal data that tends to be volatile
2. An ever-growing set of data that rarely gets accessed

When we started investigating a replacement for the existing Messages infrastructure, we wanted to take an objective approach to storage for these two usage patterns. In 2008 we open-sourced [Cassandra](#), an eventual-consistency key-value store that was already in production serving traffic for Inbox Search. Our Operations and Databases teams have extensive knowledge in managing and running MySQL, so switching off of either technology was a serious concern. We either had to move away from our investment in Cassandra or train our Operations teams to support a new, large system.

We spent a few weeks setting up a test framework to evaluate clusters of MySQL, Apache Cassandra, [Apache HBase](#), and a couple of other systems. We ultimately chose HBase. MySQL proved to not handle the long tail of data well; as indexes and data sets grew large, performance suffered. We found Cassandra's eventual consistency model to be a difficult pattern to reconcile for our new Messages infrastructure.

HBase comes with very good scalability and performance for this workload and a simpler consistency model than Cassandra. While we've done a lot of work on HBase itself over the past year, when we started we also found it to be the most feature rich in terms of our requirements (auto load balancing and failover, compression support, multiple shards per server, etc.). HDFS, the underlying filesystem used by HBase, provides several nice features such as replication, end-to-end checksums, and automatic rebalancing. Additionally, our technical teams already had a lot of development and operational expertise in HDFS from data processing with Hadoop. Since we started working on HBase, we've been focused on committing our changes back to HBase itself and working closely with the community. The open source release of HBase is what we're running today.

Since Messages accepts data from many sources such as email and SMS, we decided to write an application server from scratch instead of using our generic Web infrastructure to handle all decision making for a user's messages. It interfaces with a large number of other services: we store attachments in [Haystack](#), wrote a user discovery service on top of [Apache ZooKeeper](#), and talk to other infrastructure services for email account verification, friend relationships, privacy decisions, and delivery decisions (for example, should a message be sent over chat or SMS). We spent a lot of time making sure each of these services are reliable, robust, and performant enough to handle a real-time messaging system.

The new Messages will launch over 20 new infrastructure services to ensure you have a great product experience. We hope you enjoy using it.

Kannan is a software engineer at Facebook.



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Alexandru Rosianu, Skanda Bhargav, Konstantin Kuznetsov and 966 others like this.

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[View previous comments](#)**John Mammen** Hey can we get the performance report for the various db you have tested?

November 16, 2010 at 6:13am

**Debabrata Malick** it will be gmail killer

November 16, 2010 at 8:47am

**Rishi Kumar Patel** That's awesome.....

November 16, 2010 at 9:43am

**Lindy Chauvin Parrish** I would love to be a beta tester on this. If not, early invite?? Anxious!

November 16, 2010 at 9:44am

**Mel Ramos** brilliant job!!!!

November 16, 2010 at 11:31am

**Utkarsh Sengar** For a messaging system, why hbase's better consistency but low availability model proved better than cassandra's eventual consistent model with high availability?

November 16, 2010 at 12:08pm

**Bishwas Sinha** nice work guys !!

November 16, 2010 at 10:10pm

**Bong James** Great job facebook teams.... here is Cambodia, I proud of your teams that make world more easy

November 17, 2010 at 12:18am

**Sandeep Thirunagaru** plz provide voip calls

November 17, 2010 at 2:24am

**Stacie McDonald** Never mind voip, how bout skype? or fling?(has not a dating service-- its a form of voip)

November 18, 2010 at 6:57pm

**Nick Bingham** please could you speed up my invite, i really would like to try this service. thanks nick

November 20, 2010 at 3:35pm

**刘江** 这篇文章有人翻译成中文吗?

November 23, 2010 at 2:53am

**Marius Kriening** sending pictures (taken from webcam) doesnt work in new messages. tried sending an email and do a pic. upon sending came error. attachment works fine.

also, when are more carriers in Europe gonna be supported for sms?

November 23, 2010 at 8:15am

**Akhlaque Rahoojo** good

November 23, 2010 at 11:41am

**Bhavin Patadia** GREAT

November 23, 2010 at 12:01pm

**Roque Pinel** Seems a nice service to try on. Great job!

November 23, 2010 at 1:42pm

**Misagh Shakeri** Any information about release date ?

November 24, 2010 at 2:37am

**Kelly Mgbe** This is really innovative. I can't wait to try.

November 24, 2010 at 6:52pm

**Sirinun Intarachai D**

November 28, 2010 at 3:48pm

**Abdul Rafay Khan** good

November 30, 2010 at 3:29am

**Chung-Ho Chen** Awesome! Great achievement, Kannan!

BTW, just curious whether HBase relies on HDFS append (like HFDS-265) for WAL, in FB implementation?

November 30, 2010 at 2:33pm

**James Kokoi Ramiro** can you remove the limit of group chat please... thanks and god bless...

December 1, 2010 at 4:26pm

**Hassan Azhar** Looking forward to it! When i will get it

December 6, 2010 at 6:44am

**Jaehong Choi** awesome. keep it up.

December 6, 2010 at 6:26pm

**Frederick Stark** It would be great if you could publish a white paper about your findings when comparing the various systems.

December 7, 2010 at 6:35pm · 1

**Alwyn Balingit** Sounds like engineers of Facebook are having fun!

December 7, 2010 at 6:37pm

**Daniel Yuan** sounds complex.

December 8, 2010 at 12:10am

**Abdul Hamid Ahh Husain** "La ilaha ilal lah Muhammadur Rasulullah phi qul lilamhatinn wanaffasinn 'a da da ma wa si 'a hu ilmullah".

January 7, 2011 at 3:32pm · 1

**Maicol Moreira** Gracias por hacerlo en español!!! ~-~ igual algo manejo ingles pero cuando lo agan mas facil mejor!

January 7, 2011 at 3:49pm

**Akshay Kumar** great.....

January 7, 2011 at 10:59pm

**Bukar Abba** That is great one I Love this site

January 8, 2011 at 6:52am

**Ruchi Chauhan** great n exellentthats why fb is on top 2dy

January 8, 2011 at 10:20am · 1

**Tarun Agarwal** The way you explained Why is Awesome

January 10, 2011 at 9:42am · 1

**Martin Monsalvo** consistency in Cassandra can be tuned to meet your specific needs. Anyways, you must have a good reason to choose HBase which is also cool.

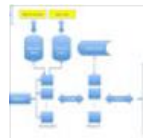
June 13, 2011 at 2:20pm

**Perter Jay** hbase is the future

June 22, 2011 at 12:03am

**Charlie Zhu** Why HBase Rocks,Cassandra Sucks ? Dose it still hold true after Cassandra 1.0 released today?

January 27, 2012 at 3:02pm · 1

**Charlie Zhu** Twitter come back to Cassandra again: <http://engineering.twitter.com/.../spiderduck-tweets...>

Twitter Engineering: SpiderDuck: Twitter's Real-time URL Fetcher

Tweets often contain URLs or links to a variety of content on the web,...

ENGINEERING.TWITTER.COM

March 19, 2012 at 12:55pm · 1

**Akram Alajou** See how I can make 30,000 per week in google adeson <http://bit.ly/18g2rpE><http://bit.ly/1jvZjW6> <http://goo.gl/fh4rqf> <http://bit.ly/1jw9tG8> <http://bit.ly/1jw9ycV><http://bit.ly/18g4JFg> <http://bit.ly/18g4QRf> <http://bit.ly/18g4VUZ> <http://bit.ly/18g4Xwd> ... See More

November 23, 2013 at 4:52pm

**Janalynj Jacar** i well be ur family for the life time i wish u goog luck.....

February 14, 2014 at 10:10am

**Irma Roa** Saludos[See Translation](#)

November 23, 2014 at 5:47pm

**Amine Lahmar** <http://technoparck.com/> the new technology website 2015

January 11 at 12:12pm

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