

3/27/2015

The Reengineering of Facebook Messages - IEEE Spectrum

they could be delivered quickly if needed. To make sure no one ever loses a message, each message is stored in each user's account, and that's replicated three times, so a one-on-one conversation has six copies. After much discussion, the engineers settled on a system called HBase (https://www.facebook.com/note.php?note_id=454991608919), an open-source database written in Java that stores data on multiple machines.

"We spent three months investigating storage systems," Bosworth says. "And maybe because we picked well—or maybe because it didn't matter that much—we haven't had a problem with it. In developing software, the thing you worry most about tends to go well because you're focused on it. It's the things you aren't worried about enough" that cause problems, he says.

**"A source of complexity is a source of bugs."
—Andrew Bosworth, Facebook director of engineering**

In fact, he says, the engineers actually overbuilt the storage system, developing a technology they called Atlas, which figures out where to send a user's data among clusters of machines running HBase. (Storing data on multiple clusters enables systems managers to fix problems or perform maintenance without turning off access for all users.) But the engineers overloaded Atlas with other features, so they ended up turning it off because it made the system more complex. Says Bosworth: "A source of complexity is a source of bugs." The effort wasn't a total waste, though. They'll likely have to bring Atlas back into the system in a few years, Bosworth says, when the number of data centers increases.

After figuring out how to store the messages, the engineers turned to the problem of spam, a bane of e-mail services. While traditional spam filters look mostly at message content, the spam filters built into Facebook messages also pay a lot of attention to who the message senders are. Messages from your friends and friends of friends bypass the spam filters and go directly into your in-box, unless you've changed the default or previously moved messages from that person out of your in-box; messages from people you aren't connected to through a friend, along with announcements from organizations or businesses, go into a folder called "other." Messages with spamlike content and no friend-of-friend connection go into a separate spam file, the link to which is tucked away at the bottom of the "other" mailbox and requires scrolling past every message in that mailbox to be seen.

The biggest problem facing the engineers was the old Facebook messaging system, with its 750 million users sending 7 billion messages a day and about seven years of messages stored in a variety of formats. "We had to morph all that data into data that would fit in with this new system," says Ranganathan, "and then actually move the data, because we were going to be storing it on a different set of servers. And we had to do all that while people were sending messages, making sure we didn't drop any messages."

**"If you lose the message that was sent 3 minutes before the upgrade, that's the worst, because it's probably the one you care most about."
—Kenny Lau, Facebook software engineer**

"That was one of the biggest engineering challenges I've ever faced," says Lau. "If you lose the message that was sent 3 minutes before the upgrade, that's the worst, because it's probably the one you care most about."

The solution, Ranganathan says, was for the migration software to briefly send messages to two places—the old data store and the new one. While a user was being moved, the new data store held messages without sorting them, while the user continued to use the old data store. When all of a user's data completed the transfer from the old servers to the new, the software took the brakes off and started sorting the messages into threads and displaying them to the user. The user never spotted a pause.

Most users were on the new system three months after the official November 2010 launch; 95 percent had moved after six months; today, roughly a year later, all users are on the new system.

While the vast majority of users didn't notice their moving days, behind the scenes the engineers weren't quite so calm. They moved over the first million or so users and let them invite their friends to join them on the new system. Then they looked at the server usage to see if their estimates of how many servers this new messaging system would require were correct. And then they got a little nervous.

"It looked like we'd probably need a hundred times more machines than we had actually ordered." —Karthik Ranganathan, Facebook software engineer

Says Ranganathan, "If we extrapolated this, it looked like we'd probably need a hundred times more machines than we had actually ordered."

What was going on? Had they made a mistake?

The engineers debated intensely for a couple of days, Ranganathan recalls, before zeroing in on what was causing the discrepancy. The first million users migrated were particularly active Facebook users, chosen because the developers figured these users would appreciate the new software the most. The friends they invited were also likely to be particularly active users.

The engineers changed their rollout strategy, adding more randomness in the user selection, and breathed a sigh of relief when it looked like their projected storage requirements were going to hold.

The migration went along smoothly for a while after that. Then, after about half of Facebook's then 600 million-plus users had been moved over, the engineers realized they had another problem—new Facebook users were initially going on the old messaging system, joining the migration queue. "We hadn't thought about the new users," Ranganathan says. "We knew we had 500 or 600 million people to move, not [thinking] about who joins every day. But then we realized that we had a boat with a hole in it, and we're trying to bail out the water, but the water is going to keep coming until you plug the hole."

EXHIBIT I

Once the hole was plugged and new users started on the new system, the migration went fairly smoothly. When a user's messages didn't migrate successfully, the user didn't notice; the messages just stayed on the old system until the engineers figured out what the problem was and fixed it.

This summer, Facebook added a messaging app for mobile phones, further blurring the line between text and chat and e-mail. The biggest trick to that, Bosworth says, was keeping a connection open between the phone and Facebook so messages could be sent seamlessly, without gobbling up the users' data allotments or draining phone batteries. The solution ended up being a technology that minimizes the amount of data transmitted, called MQTT (Message Queue Telemetry Transport) (<http://mqtt.org/>). MQTT is an open protocol developed by IBM that was originally used for satellite telemetry.

Today, more than 8 billion private messages fly through Facebook Messages daily. Will this kind of messaging platform kill e-mail? Bosworth says no. "The post office is still in service. E-mail won't go away." But, he says, the future of everyday communications will look a lot more like Facebook Messages.

BUSINESS INSIDER

How To Find Facebook Messages That Facebook Is Hiding From You



JAY YAROW

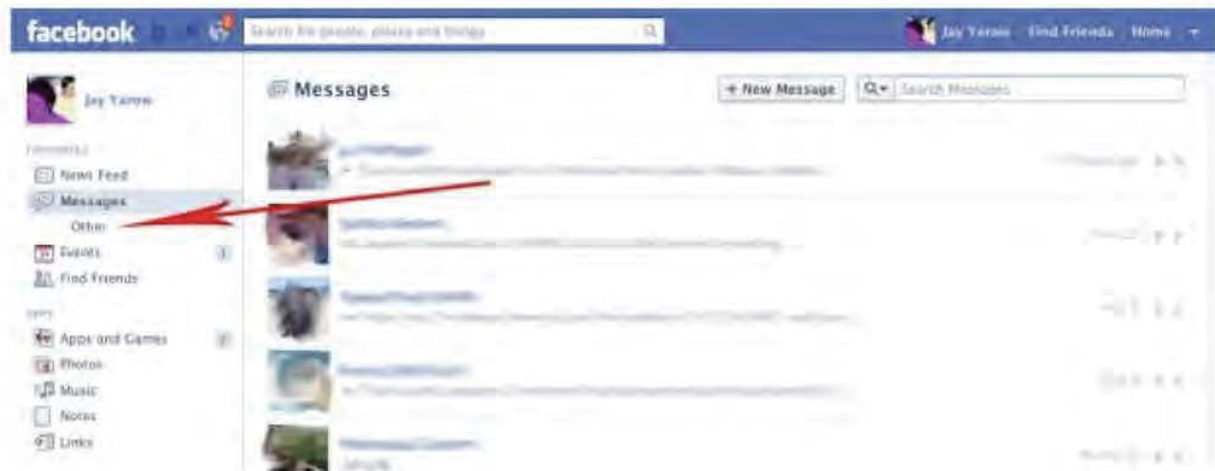
JUN. 15, 2012, 11:26 AM

Facebook has a pretty aggressive spam filter to keep messages from creepers, and trolls from hitting your Facebook message inbox.

Like any spam filter, though, it's sometimes too aggressive, and grabs messages that aren't spam. (Maybe this is old news to some of you, but for a lot of us in the [Business Insider](#) newsroom, we were surprised.)

How can you check these messages? Click on there "other section of messages."

Here's how. Go to messages, and then click on "other."



Screenshot

Then you can see all the creepers who have been trying to talk to you:



Screenshot

* Copyright © 2015 Business Insider Inc. All rights reserved.

Search CNET [Reviews](#) [News](#) [Video](#) [How To](#) [Download](#) [US Edition](#)

CNET > Internet > Facebook processes more than 500 TB of data daily

Facebook processes more than 500 TB of data daily

The site manages millions of photos and processes billions of likes each day. That's a whole lot of sharing.

by Donna Tam @DonnaYTam / August 22, 2012 2:02 PM PDT

[0](#) / [f](#) / [t](#) / [in](#) / [g+](#) / [more +](#)

Since Facebook uses this data to build its user experience, it wants teams from across the company -- whether they sell ads or build functions -- to be able to access any of the data as needed. Parikh said this keeps the creation and improvement of Facebook features as fast as possible.

A function like friend recommendations, for example, needs constant data updates, so that when you add a new friend, you see those connections immediately, Parikh said.

These nearly real-time efforts apply to most functions throughout the site because people won't use the site if the personalized experience is poor, or slow, he said.

"We can't afford for your photo be be uploaded and stored next week," Parikh said.



Jay Parikh runs Facebook infrastructure

Facebook

THIS WEEK'S MUST READS /

- Facebook processes more than 500 TB of data daily**
Internet
- Samsung bets big on April 10 launch of Galaxy S6, S6 Edge**
Mobile
- BlackBerry shows signs of life, posts surprise quarterly profit**
Mobile
- Apple's Tim Cook plans to donate his wealth to charity**
Tech Industry
- Intel, Micron, Toshiba promise storage that's fast and roomy**
Computers

RELATED STORIES

- [Reporters' Roundtable: Buzz vs. privacy \(podcast\)](#)
- [iPhoto to Aperture: Carryover features compared](#)
- [Twitter, Facebook use up 82 percent](#)

Instead of partitioning the data -- essentially dividing it up and storing it based on criteria -- like most companies do to make data more manageable, Facebook keeps it in one place for easy access.

That means an engineer who wants to identify stats or trends in a function, like how quickly people respond to messages, can easily get the data, write a code, and get results.

When pressed by reporters, Parikh said Facebook has a zero-tolerance policy when it comes to any abuse from this broad access. Additionally, all access is logged and monitored heavily, he said.

If you want to see Parikh's short presentation and a flow chart of its data system, see below.

Updated at 3:03 p.m. PT: *with more info and a slideshow.*

- [Share](#)
- [Embed](#)

-
-
-
-
-
-

of 4

Tags: Internet, Facebook

ABOUT THE AUTHOR



Donna Tam /   

Donna Tam covers Amazon and other fun stuff for CNET News. She is a San Francisco native who enjoys feasting, merrymaking, checking her Gmail and reading her Kindle. [See full bio](#)

DISCUSS FACEBOOK PROCESSES MORE THAN 500 TB OF DATA DAILY

Show Comments

LATEST ARTICLES FROM CNET



Comedian Will Ferrell belts out 'Star Trek' theme



HTC's design chief leaves the company



Get Sol Republic Tracks Air Bluetooth headphones for \$74.95



More 'Walking Dead' seasons get their turn at 8-bit gory glory



Be the Batman your city deserves (for only \$682M)

© CBS Interactive Inc. / All Rights Reserved.

/ Privacy Policy / Ad Choice / Terms of Use / Mobile User Agreement



REVIEWS

- All Reviews
- Audio
- Cameras
- Car Tech
- Desktops
- Laptops
- Phones
- Tablets
- TVs

NEWS

- All News
- Apple
- Crave
- Internet
- Microsoft
- Mobile
- Sci-Tech
- Security
- Tech Industry

VIDEO

- All Video
- Apple Byte
- CNET On Cars
- CNET Top 5
- CNET Update
- Next Big Thing
- The 404
- The Fix
- XCAR

MORE

- About CBS Interactive
- About CNET
- CNET 100
- CNET Deals
- CNET Forums
- CNET Magazine
- CNET Mobile
- Help Center
- Permissions

FOLLOW CNET VIA...

- Facebook
- Twitter
- Google+
- YouTube
- LinkedIn
- Tumblr
- Pinterest
- Newsletters
- RSS

facebook [Sign Up](#)

Email or Phone

Password

[Log In](#)

Keep me logged in

[Forgot your password?](#)

Relevant Ads That Protect Your Privacy

September 30, 2012 at 8:55am

Many sites across the web provide free services by including advertisements. Facebook is no exception, and as we pursue our goal of making the world more open and connected, we have designed our service to show ads that help people discover products that are interesting to them. We also recognize that our users trust us to protect the information they share on Facebook. Maintaining that trust is a top priority as we continue to grow.

In the last few weeks, we have introduced several features that give advertisers new ways of reaching people who use Facebook. Many other advertising companies already offer services similar to these new features. We wanted to share some of the ways we have carefully designed our versions of the features with your privacy in mind.

Facebook Exchange

Facebook Exchange (FBX) gives marketers an opportunity to bid on showing ads in real time. Approved third-party service providers work with Facebook and marketers to enable this process. We agree with a provider on an ID number (separate from your Facebook ID) for each visitor's browser. If someone then visits Facebook and his or her browser has that ID, we notify the service provider, who tells us when a marketer wants to show a particular ad. This allows marketers to show you ads relevant to your existing relationship with them – and without them needing to send us any personal information about you.

When we show an FBX ad on Facebook, it includes an "X" link that lets you provide feedback about ads. We also provide a link that lets you learn more about and choose to opt out of future ads from the service provider responsible for that ad. Also, we only work with providers that agree to technical and policy requirements that protect the privacy of personal information.

Custom Audiences

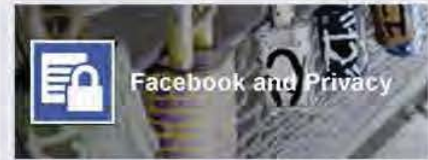
Another one of our new features allows marketers to reach people on Facebook using information they already have. For example, a shoe store might want to show a special offer to people who have already bought shoes from them. The store can provide us with "hashes" of their customers' email addresses so that we can show those same people the ad without the store having to send us the actual email addresses.

These hashes are bits of text that uniquely identify a piece of data (such as an email address) but are designed to protect against reverse engineering which would reveal that data. Since Facebook and the store use the same method to create each hash, we can compare the store's hashes to hashes of addresses in our records and show the ad to any group of users that match. If a hash from the store does not match any of ours, we discard it without ever discovering the corresponding email address and without storing any information that we did not have before. And once we no longer need the hashes that do match, we delete them too.

Measuring Advertising Performance

Finally, we recently partnered with a company called Datalogix to offer marketers a way to measure how their ads on Facebook drive sales for their products in stores. This allows marketers to better understand the value of the investments they are making in Facebook and helps us provide advertising that is more interesting to our users. Companies have long used similar studies for newspaper, TV, and radio ads, and our relationship with Datalogix lets us provide the same kind of information to Facebook marketers at scale.

Importantly, we have designed this process with privacy at the forefront. We compare hashes of some Facebook data with hashes provided to us by Datalogix. Once we



Notes by Facebook and Privacy

All Notes

[Get Notes via RSS](#)

[Embed Post](#)

compare, we are able to send corresponding data on the reach of large-scale ad campaigns, which Datalogix uses to create aggregate reports comparing product purchases by large groups of people who did or did not see an ad.

Because of our commitment to privacy, we had an industry-leading auditing firm evaluate the privacy implications of this process. The auditor confirmed that, throughout this process, Datalogix is not allowed to learn more about you from Facebook profile information. Similarly, Datalogix does not send us any of their purchase data, meaning we cannot specifically tell whether or not you purchased a marketer's product. Finally, with this partnership, Datalogix only sends the marketer aggregate information about large groups of people. None of this data is attributable to an individual Facebook user.

Creating Value With Privacy

Advertising helps keep Facebook free. We believe we can create value for the people who use our services every day by offering relevant ads that also incorporate industry-leading privacy protections. In our view, this is a win-win situation for marketers and for you.

Joey Tyson, Privacy Engineer

Like · Comment · Share

👍 Sylvia Price, Sasikam Sakha, Max Guadagnoli and 579 others like this.

🔗 93 shares

🗨️ View previous comments



Hjen Dao thich

November 21, 2012 at 12:50pm



Rakesh Kumar loser face book

November 28, 2012 at 5:06am



Kateřina Kirnagová potřebovala by ch poradit, na hlavní straně jsem fotila příspěvky z kolonky webkamera a ted se mi ta kolonka vůbec nezobrazuje, jenom náhrát fotky z počítače, neví někdo proč??

See Translation

November 28, 2012 at 6:10am



Teresa Batchelor I dont have time to opt out of every ad.....stop this nonsense.....its very irritating....

November 28, 2012 at 9:46am



Iqbal Mirzahamza Iqbal Mirzahamza very nice...

November 29, 2012 at 9:42am



Mike Faley Are custom audiences currently live?

December 4, 2012 at 2:58pm · 👍 1



Samaila Abubakar you are so wonderfull with beuer job, nicely and brightfull internate system.

December 6, 2012 at 4:05am



Karala Faisal Thali hai

December 13, 2012 at 8:58pm · 👍 1



Sunil Prasad my facebook friend request is blocked please help me

December 22, 2012 at 12:40am · 👍 1



Acziu Tan tdlghdghdghdc

December 31, 2012 at 7:35am



Ruben Jr Luminario Asis my.facebook.is...harassing

January 3, 2013 at 4:53pm



Nick McGuire I would love to be able to get rid of all the crap on the right side of my page, I.E. game adds and such

January 3, 2013 at 5:27pm · 👍 4



Ikhlauque Nazir how do i find out when i will be unblocked can some one guide me please

January 14, 2013 at 1:33pm



Eirini Fanos Panagidou I NEED MY SITUATION UPDATE TO BE VISIBLE TO ALL FACEBOOK AS He was again

January 19, 2013 at 11:43pm



Juliana Ferreira Bevilacqua Estão aparecendo fotos explicitas e nojentas no meu feed de noticias...e emotions na minha caisa de mensagem, exluam isso por favor!!!!!!

See Translation

February 27, 2013 at 2:18pm



FAER design Dear Facebook could just have a look on your security laws for this page that I have now, please! It 's been an accident opening this! If it costs me this page, please please immediately block/delete this Jusufi ' s Graphic Design , right now! Please!

March 15, 2013 at 7:32pm · 👍 1



Susan O'Banion I detest this invasion of ads in my posts.
April 4, 2013 at 5:46pm · 1



Kanhaiya Upadhyay Great innovation, 😊
July 11, 2013 at 3:41pm · 1



Ehab Mansour kod
October 16, 2013 at 5:48pm



Ahmad Tovi bf
October 23, 2013 at 3:03pm



Nancy Forsythe Keep it clean and safe for all of your members, please.
October 25, 2013 at 7:15pm · 1



Zafir Elisa cum pot bloca o persoana care nu o am in lista de prieteni?
See Translation
November 21, 2013 at 2:46am



Thanapat Piriya I agree, I prefer Law UNSW (The University of New South Wales) thank-you . i Love you .Jesusพระเยซู พิณพิณ Thanapat Piriya Lord .
See Translation
December 2, 2013 at 11:50pm



Nafish Akram Hello
December 7, 2013 at 6:48am · 1



Ch Jajja balk rack book
December 13, 2013 at 4:30pm



Ch Jajja yes
December 13, 2013 at 4:31pm



Nandhu KD I have no public option
December 18, 2013 at 5:23am



Shohel Saiful Jan ad me
December 20, 2013 at 5:39am



Barbara Holmes this is too time you have took my money I post \$50 to Fashland and got nothing for my money, please facebook look in to this. some one there is taking my money and not giving me nothing for it have been taking from my account. this is were it was t... See More
February 21, 2014 at 7:46am · 1



Maksimovic Blagoje <div id="fb-root"></div> <script>(function(d, s, id) { var js, fjs = d.getElementsByTagName(s)[0]; if (d.getElementById(id)) return; js = d.createElement(s); js.id = id; js.src = "//connect.facebook.net/sr_RS/all.js#xfbml=1"; fjs.parentNode.insertBefore... See More
April 7, 2014 at 1:09am



Mary Gevorgyan I am the new ruler of this profile and would like to change the name of the month and date of birth please help me
April 12, 2014 at 3:02am



Mary Gevorgyan v
April 12, 2014 at 3:02am



Mary Gevorgyan I am the new ruler of this profile and would like to change the name of the month and date of birth please help me
April 12, 2014 at 3:02am



Mary Gevorgyan I am the new ruler of this profile and would like to change the name of the month and date of birth please help me
April 12, 2014 at 3:02am



Mary Gevorgyan I am the new ruler of this profile and would like to change the name of the month and date of birth please help me
April 12, 2014 at 3:02am



Roberto Carlos Marquez Por favor traducir los textos al aespañol
See Translation
May 1, 2014 at 4:01am



Roberto Carlos Marquez Traducir textos al idioma español.No conozco el idioma ingles.
See Translation
May 1, 2014 at 4:03am · 1



Patricia Ranatza I blocked a friend by mistake, and don't how to get him back. Please advise all help appreciated Name Len Guidroz.Didn't know what option to go to for this to be corrected.
May 23, 2014 at 8:09am



Richard Ballard Frankly I don't see how flooding MY page with stuff counter to what I believe because someone I know "liked" a page is protecting my privacy. In fact it does just the opposite. And ad targeting only helps those running the ads so quit trying to blow sm... See More
March 12 at 5:50pm · Edited

3/27/2015

Relevant Ads That Protect Your Privacy

Facebook © 2015
English (US)

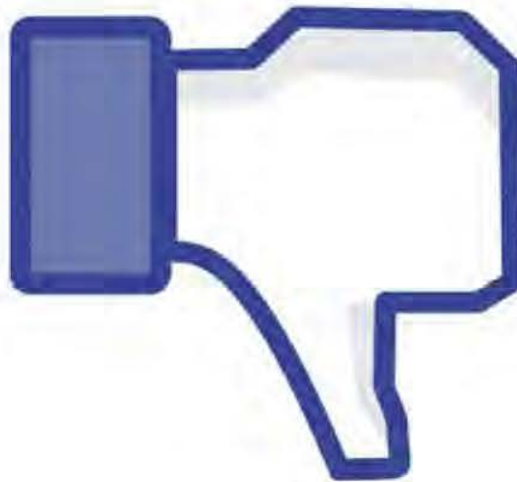
GIZMODO

Facebook Is Reading Your Messages and Liking Things For You (Updated: Not as Bad as We Thought)



Sam Biddle

Filed to: FACEBOOK 10/04/12 10:41am



You might think clicking "Like" is the only way to stamp that public FB affirmation on something—you're wrong. Facebook is checking your private messages and automatically liking things you talk about. **Update:** Sort of.

The scanning ~~which is either an oversight on Facebook's part of a deliberate effort~~—we're waiting to hear back from FB increases the Like count for a given page Like-able link just by you talking about it. Auto-scanning is nothing new: Gmail

has done it since day one to serve us ads. But there are serious potential personal consequences here—what if I'm talking about something disgusting, loathsome, and offensive with a friend? Do I want Facebook to automatically chalk that up as a Like? No. And I doubt you do either.

The auto-liking could also be a big deal for those who want to artificially inflate their popularity online—say, people with something to sell. "Yeap, it won't drive any traffic to your website. But if your [*sic*] visiting an online store and you see a lot of likes under the product then this might cloud your judgement," notes one commenter on Hacker News, where the mechanism was first reported.

~~To test the auto-scanning, message this link to a friend—it should increase the like count by two. I was able to independently verify the same effect by messaging a link to singer The-Dream's official page to a friend. It increased his Likes without me ever clicking the button. As much as I truly to Like (and love!) The-Dream, this isn't how it's supposed to work, Facebook. It turns out this was just a very unlikely coincidence that played out in more than one place—the auto-liking only applies to external links with embedded Facebook liking. So, say I send someone a private Facebook message with a Gizmodo post, which contains a Like button. That will increase the counter, not talking about The-Dream on FB itself.~~

So your name isn't being associated publicly with something you're talking about privately—but if even a mention is enough to kick up a Like, it seems like that's pretty heavily diluting (even further) what "like" even means—from preference to mere reference. Would you say every single proper noun you utter each day should be something you like? [Hacker News via Forbes]

Update: According to a Facebook spokesperson, although messaging will auto-increase a page or link's Like count, it won't publicly associate you with that Like. In other words, your identity won't be exposed. The full statement is below:

Absolutely no private information has been exposed. Each time a person shares a URL to Facebook, including through messages, the number of shares displayed on the social plugin for that website increases. Our systems parse the URL being shared in order to render the appropriate preview, and to also ensure that the message is not spam. These counts do not affect the privacy settings of content, and URLs shared through private messages are not attributed publicly with user profiles.

We did recently find a bug with our social plugins where at times the count for the Share or Like goes up by two, and we are working on fix to solve the issue now. To be clear, this only affects social plugins off of Facebook and is not related to Facebook Page likes. This bug does not impact the user experience with messages or what appears on their timelines.

Update 2: Facebook has further clarified the auto-like mechanism, explaining that Facebook Pages aren't affected:

Absolutely no private information has been exposed and Facebook is not automatically Liking any Facebook Pages on a user's behalf.

Many websites that use Facebook's 'Like', 'Recommend', or 'Share' buttons also carry a counter next to them. This counter reflects the number of times people have clicked those buttons and also the number of times people have shared that page's link on Facebook. When the count is increased via shares over private messages, no user information is exchanged, and privacy settings of content are unaffected. Links shared through messages do not affect the Like count on Facebook Pages.

We did recently find a bug with our social plugins where at times the count for the Share or Like goes up by two, and we are working on fix to solve the issue now. To be clear, this only affects social plugins off of Facebook and is not related to Facebook Page likes. This bug does not impact the user experience with messages or what appears on their timelines.

Powered by Kinja

Technology**Facebook 'likes' automatically added without user-clicks**4 October 2012 | [Technology](#)

Facebook "likes" are being added to webpages even if a user has not clicked a like button, or even visited the page in question, the company has admitted.

A US security researcher found that simply sending a web address to a friend using Facebook's private messaging function would add two likes to that page.

Leaving a comment on a story within Facebook also adds to the tally.

The site told the BBC that no private information had been exposed.

The revelations coincided with the news that the network has surpassed one billion monthly active monthly users.

"Many websites that use Facebook's 'like' or 'recommend' buttons also carry a counter next to them," the site explained.

"This counter reflects the number of times people have clicked those buttons and also the number of times people have shared that page's link on Facebook.

"When the count is increased via page shares, no user information is exchanged.

"We did recently find a bug with our social plug-ins where at times the count for the Share or Like goes up by two, and we are working on fix to solve the issue now."

'Like fraud'

The site explained that the figure represented how many times an item was shared - not how often users had clicked "like" on the page.



Likes are seen as an indication of a particular page's popularity

However, the number appears next to the word "like" and the site's distinctive thumbs up icon.

The system means that users who may be sharing pages to highlight negative content - such as campaigners - are inadvertently making the page appear more popular.

In **documentation relating to the function of the like button**, Facebook details four criteria which cause the likes number to increase - only one of which involves clicking the like button.

Facebook stressed that the added likes were anonymous, and would not appear on the user's timeline.

The site also said that its figure of 1.13 trillion likes - which was publicised as part of its announcement of having one billion active users - was not affected.

But researcher Ashkan Soltani, **writing in the Wall Street Journal**, argued that inflating the numbers in this way raises the prospect of "like fraud".

He quoted an online commenter who pointed out that "if [you're] visiting an online store and you see a lot of likes under the product then this might cloud your judgement".

One expert told the BBC the findings were "disturbing".

"Something intended for one purpose is being used for something completely different," said Prof Alan Woodward from the University of Surrey.

"What else is being done automatically that we don't know about?"

Share this story About sharing



More on this story

Facebook surpasses one billion users as it tempts new markets

5 October 2012

Facebook deleting fake 'likes', independent data suggests

27 September 2012

Facebook acts on fake 'likes'

3 September 2012

More Technology stories

Safari users win right to sue
27 March 2015

Children on screens six hours a day
27 March 2015

Tinder prank 'tricked flirting men'
26 March 2015

More Videos from the BBC



Flooding in Brazil



Tornadoes rip through Oklahoma



Prince's vault 'full of treasure'



New 3D printer 'grows' its objects



Nigeria elections: Economy explained



Bringing Russian bathhouses to Britain

Recommended by Outbrain

Top Stories

Alps crash co-pilot 'had depression'

Boko Haram HQ in Nigeria 'retaken'

Duo ready for one year in space

Features & Analysis



Dresden drama

How Vladimir Putin's KGB days in Germany left a permanent mark



▶ 4:18

'It tastes like chicken'

The life of a rare fruit collector



'Magic bunny'

China's endangered Ili Pika goes viral



▶ 2:31

Fridge revelations

What does your food shopping say about you?



Essential Cinders

Branagh goes back to basics for new Cinderella

7 days quiz

What degree did the most billionaires study?

Tracking Britain's jihadists

The stories behind those who back IS

Out of service

The rise of fake support animals

Internet gossip

Why are we so mean online?

Most Popular

Read

Watched

Alps crash co-pilot 'hid illness'

1