



Enterprise Social for the Java Platform

Shares, Mashups, Likes, and Ways to
Integrate Social Media into Your Cloud
Native Enterprise Java Applications

Werner Keil

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*This book is dedicated to my beautiful wife and my wonderful children,
for their patience and understanding as well as giving me the energy
and motivation to finish this book.*

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About the Author



Werner Keil is a Cloud Native consultant, Jakarta EE and Microservice expert for the financial sector. He helps Global 500 enterprises across industries and leading IT vendors. He worked for over 30 years as IT manager, PM, coach, and SW architect and consultant for the finance, mobile, media, transport, and public sectors. Werner develops enterprise systems using Java, Java/Jakarta EE, Oracle, IBM, Spring or Microsoft technologies, JavaScript, Node.js, Angular, and dynamic or functional languages. He is a Committer at Apache Foundation and Eclipse Foundation, a Babel Language Champion, a UOMo Project Lead, and an active member of the Java Community Process in JSRs

like 321 (Trusted Java), 344 (JSF 2.2), 354 (Money, also Maintenance Lead), 358/364 (JCP.next), 362 (Portlet 3), 363 (Unit-API 1), 365 (CDI 2), 366 (Java EE 8), 375 (Java EE Security), 380 (Bean Validation 2), and 385 (Unit-API 2, also Spec Lead), and was the longest serving Individual Member of the Executive Committee for nine years in a row until 2017. Werner is currently the Committer Member representative in the Jakarta EE Specification Committee. He was among the first five Jakarta EE Ambassadors when it was founded as Java EE Guardians and is a member of its leadership council.

About the Technical Reviewer



Reza Rahman is Principal Program Manager for Java on Azure at Microsoft. He works to make sure Java developers are first class citizens at Microsoft and Microsoft is a first class citizen of the Java ecosystem.

Reza has been an official Java technologist at Oracle. He is the author of the popular book *EJB 3 in Action* from Manning Publications. Reza has long been a frequent speaker at Java User Groups and conferences worldwide including JavaOne and Devvxx. He has been the lead for the Java EE track at JavaOne as well as a JavaOne Rock Star Speaker award recipient. He was the program chair for the inaugural JakartaOne conference. Reza is an avid contributor to industry journals like *DZone*. He has been a member of the Java EE, EJB, and JMS expert groups over the years. Reza implemented the EJB container for the Resin open source Java EE application server. He helps lead the Philadelphia Java User Group. Reza is proud to be a founding member of the Jakarta EE Ambassadors.

Reza has over a decade of experience with technology leadership, enterprise architecture, and consulting. He has been working with Java EE technology since its inception, developing on almost every major application platform ranging from Tomcat to JBoss, GlassFish, WebSphere, and WebLogic. Reza has developed enterprise systems for well-known companies like eBay, Motorola, Comcast, Nokia, Prudential, Guardian Life, USAA, Independence Blue Cross, Anthem, Capital One, and AAA using Java EE and Spring. He is particularly interested in distributed systems, messaging, middleware, persistence, and machine learning.

Reza is an inductee to Phi Beta Kappa, the oldest and most respected national honor society for undergraduates in liberal arts and sciences. He earned his bachelor's degree from Gettysburg College. He graduated summa cum laude with a double major in computer science and economics as well as a minor in mathematics.

Foreword

From the streets of Cairo and the Arab Spring, to Occupy Wall Street, from the busy political calendar to the aftermath of the tsunami in Japan, social media was not only sharing the news but driving it.

—Dan Rather (American journalist, eight-time Peabody award winner)

Freedom of expression, especially when inspired by innocent intention, is the defining force behind open societies. This powerful force now has new wings thanks to social media. Social media grants voice to the unheard all around this ever turbulent little planet of ours, and we are still only beginning to see what it can do – be it in Kiev, Moscow, Minneapolis, Ferguson, Tunis, Cairo, Riyadh, Tehran, Hong Kong, Beijing, Tel Aviv, or Gaza.

Despite the pivotal role social media plays in modern life, there are few books that cover the topic of social media and Java. What little material there is usually covers the most common use case – federated security using OIDC and JWT. Perhaps consequently, there are few Java applications that fully utilize social media despite the wide open space of what is possible. This is precisely why this book is so important. It provides a great background of the social media industry, explains the core concepts important for Java social media developers, describes the so far relatively feeble efforts toward standardization, outlines social security for Java, and of course covers the social media frameworks and APIs most relevant to Java. Given the volatility, breadth, depth, and complexity of the topic, this book was no doubt a very tough one to write. To boot I can't think of a better person than Werner to write the book. He has been involved in the space for a long time ever since the Agorava project and the nascent effort to standardize a social media API in Java. His command of the space is evident throughout the book.

I hope the book will prove invaluable to any Java social media developer.

—Reza Rahman
Principal Program Manager, Java on Azure at Microsoft
Jakarta EE Ambassador, author, speaker

CHAPTER 1

Introduction

This chapter tells the history of social media from ancient days until more recently. The first few decades of the 21st century are often considered the “heydays” of social media between the “DotCom Bubble” and the financial crisis of 2008. We look further into the years that came after that, until the very recent history and what the future might bring for social media.

Ancient History

Most people assume social media to be a modern-day invention of companies like Facebook, Twitter, Google, Myspace, and Yahoo! In actual fact, social media has a history that reaches back over thousands of years.

To some, the postal service was one of the earliest forms of social media. From the days of the ancient Persian postal service to the Greek Agora [1] and Roman Forum [2], the postal service served as a medium for social and political discussion. The first recorded equivalents to Wiki or “Forum posts” were literally carved into the walls of Roman Forums or similar buildings [3], recording events like the destruction of Pompeii by Mount Vesuvius or several parts of Rome under Nero.

The Ancient Agora of Athens acted as an incubator to democracy being a favorite venue for social and political debate while doing business in ancient Greece. Until today, this worked in similar ways while the forums often turned digital. From Tunisia to Ukraine, opposition movements used social media to bring democracy to places where it’s often been surprising and uncommon for a long time [4].

The telegraph was invented in 1792, allowing to deliver personal messages over long distances much faster than a horse rider or stagecoach could carry them. Although telegraph messages were short (much like SMS or tweets), they were a revolutionary way to spread news and exchange information. Many people think that was the birth of social media.

While several countries like the United States continue to offer postal telegrams, even to the President or other officials, the German postal service shut down its telegram service on New Year’s Eve 2022 [39].



Figure 1-1. Morse-Vail Telegraph Key

Modern History

During the 20th century, information technology as we know it now started with pioneers like Konrad Zuse, George Stibitz, or Howard Aiken, and of course Alan Turing, who created the Turing test as a benchmark for AI and social bots.

Generation X

In 1975, shortly before the American military pulled out of Vietnam, the libertarian thinker Samuel Edward Konkin III introduced a philosophy called Agorism, a social philosophy of counter-economics and the ideas associated with that practice [5]. In a market anarchist society, law and security would be provided by market actors instead of political institutions. Agorists recognize that the situation cannot develop through political reform. Instead, it shall arise as a result of market processes. Aspects of its social values can be found today in the Occupy Movement, its primary goal being to make the economic and political relations in all societies less vertically hierarchical and more flatly distributed. Or in protest parties like Beppe Grillo in Italy, Syriza in Greece (where

it even took over government), Podemos in Spain, or the Pirate Parties. Agorism also put forth the idea of using different currencies, something modern social media and related online communities are adopting with digital currencies like Bitcoin.

In 1966, the email was invented, ARPANET, a network of computers created by the US military about a year later, followed by the arrival of CompuServe in 1969. CompuServe launched its email service in the late 1980s and expanded into early 1990s, before finally dissolving original CompuServe in 2009 after several takeovers.

Usenet started up in 1979 and provided its users with forums and newsgroups. Surprisingly, most of their functions have changed very little and still exist today.

Internet Relay Chat (IRC) began in 1988 and was widely used across academic networks before emerging into what is now the Internet. IRC remains quite active today, although it is largely overshadowed by other short messaging services like Twitter. There are still around 3200 IRC servers around the world with hundreds of thousands of channels available.

Millennials

Based on the notion of Six Degrees of Separation [6], the first modern social network, sixdegrees.com, was founded in 1997. It allowed members to link to other members as friends, write messages, or post on bulletin boards. After being sold onto another company for \$125 million, it was shut down in 2001 with roughly around one million users. It later made a minor comeback and still exists today.

When services like Amazon, Yahoo!, and, in 1998, Google first came into existence, they were not considered social networks. In 1995, Microsoft picked up on the emerging trends by launching the Microsoft Network (MSN). MSN became known as a “portal,” another word for personalized online community. It wasn’t surprising when many portal products, servers, and vendors jumped the social bandwagon a few years later.

Both Microsoft and Yahoo! had fallen behind some of social media’s new kids on the block, and besides a rather brilliant and fast move with YouTube, most other aspects of social media were also a bit underestimated by Google, until it returned via Google+ and is certainly here to stay even if it may not lead every aspect of it. Yahoo! also offers plenty of social features and has since its recent recovery taken over smaller vendors in the social networking space like Flickr or Tumblr. In 1999, Brad Fitzpatrick, who later also worked at Google, founded LiveJournal.

Generation Z

At the start of the 2000s, many social networks were founded, although not so many of them survived until today. Hot or Not (AmIHotOrNot.com) was founded in October 2000 by James Hong and Jim Young, two friends and fellow students at the University of California in Berkeley. The initial motivation for the site was an argument about women's attractiveness by the founders. It was the first site to upload photos for others to rate and allegedly influenced the creators of Facebook or YouTube. In 2008, Hot or Not was sold for a rumored \$20 million to the owners of online dating service Ashley Madison (which later became infamous for losing all its customer data to hackers) and in 2012 purchased by Badoo, which is now part of the Bumble dating app conglomerate.

While the URL still exists, the app has been rebranded to "Chat & Date" and has very little in common with the original site, but Hot or Not can of course be seen as the first predecessor to modern dating apps like Tinder.

Friendster, founded in 2002, was originally also planned as a dating site similar to Hot or Not, but it became a site to connect with like-minded people and their common friends. It contained a profile and status updates, allowing you to share your mood and exchange messages.

Until early 2004 it was the biggest and most popular social network, something that eventually doomed it, because it could not scale to handle user demand and left many of them frustrated, looking for alternatives. In 2003, Google offered \$30 million to purchase Friendster, but the founders turned that offer down. In 2009, it was acquired after all by an Internet company named MOL Global in Kuala Lumpur. Besides a mostly Asian user base, Friendster's patents were also a vital asset, including one for a "system, method, and apparatus for connecting users in an online computer system based on their relationships within social networks." Most of these core social infrastructure patents were bought by Facebook for \$40 million in 2010.

A year later Friendster became a social gaming site. On June 14, 2015, the site was shut down, and three years later in 2018, the company was terminated.

Also founded in 2002, LinkedIn, later sometimes considered a "Myspace for adults," was the first social network to offer users a paid premium package. Its job market and subscriptions helped it to become profitable in 2006. The job market and online resume would become a key feature, making it a more professional social network compared to others.

In 2011, LinkedIn filed an IPO. Five years later in 2016, Microsoft acquired LinkedIn for \$26.2 billion, the second largest acquisition behind the video game producer

Activision Blizzard, Microsoft tried to buy for \$68.7 billion in 2022 [42]. UK regulators had raised concerns, but eventually on October 13, 2023 (even a Friday) they approved it.

Myspace (MySpace before its rebranding in 2012), Friendster's biggest rival that started in 2003, benefited most from frustration about the technical issues. Originally inspired by Friendster, it also offered some improvements like customization or public profiles that did not require logging into it first. In February 2005, MySpace rejected an offer by Mark Zuckerberg to sell Facebook for \$75 million. Just a few months later, Fox News parent company News Corporation purchased MySpace itself for USD 580 million. Until 2008 MySpace was the leading social networking site, but it was surpassed by Facebook in 2009 and since then rapidly lost users. In June 2011, Specific Media Group and Justin Timberlake purchased Myspace for approximately \$35 million after News Corp had nearly paid a billion 6 years earlier. A reason for Timberlake's involvement was that Myspace had its own record label after the News Corp. takeover and it generally appealed more to artists. Between 2016 and 2018 through a series of takeovers, Myspace got purchased by what's now the Dotdash Meredith media group.

It still exists with roughly around six million users, compared to hundreds of millions during its heyday.

Also, in 2003, Mark Zuckerberg launched Facemash, a kind of Harvard University's answer to Berkeley's Hot or Not, rebranding it as "The Facebook" in 2004. The one millionth user joined the same year.

In 2005, the site dropped the "the" and became just "Facebook," after the "Facebook.com" domain was purchased for \$200k, which seemed like a bargain compared to several takeovers, most notably Facebook buying up Instagram for close to a billion dollars or its gigantic takeover bid for the mobile messaging service WhatsApp.

Around that time a myriad of social networking sites came into existence. Photo sharing sites like Photobucket or Flickr, social bookmarking site del.icio.us, Reddit, or the blogging platform WordPress all started between 2003 and 2005.

StudiVZ and derivatives like SchülerVZ or MeinVZ were a social network for students, founded on November 11, 2005 (coincidentally both "Singles Day" and the beginning of Carnival) in Berlin by two students named Ehssan Dariani (who became CEO) and Dennis Bemann. A major feature of StudiVZ was the so-called "gruscheln" (a mix of the German words "grüßen" = greet and "kuscheln," meaning to cuddle). It was similar to Facebook's poking function, allowing users to write short notifications, or the feature InterNations used to call "twinkle".

As of 2010, the VZ Networks claimed a total user base of over 16 million users. However, soon after, many users became inactive or left the network, which faced a decline of 70–80% compared to the years before. On September 7, 2017, the owner Poolworks declared StudiVZ bankrupt. In March 2022, the network was shut down.

YouTube also started in 2005, a year after competing the online video site Vimeo. The first video was “Me at the zoo” [40] filmed in the San Diego Zoo, which so far (Q1/2023) had over 260 million views since then. Just a year later in 2006, Google acquired YouTube for \$1.65 billion.

2006 was also the year Twitter hatched. Similar to Facebook, the name changed slightly, but notably from “Twtrr” to an easier to pronounce name. The first tweet was posted by co-founder Jack Dorsey (@Jack) on March 21, 2006: “just setting up my twtrr.”

A year later the hashtag was invented. The symbol was inspired by the channel names in IRC, now used by many leading social networks. Initially Twitter had a character limit of 140 characters, along the lines of SMS text messages. It took over a decade to double that to 280 in 2017.

In 2007, Twitch was launched, then under the name Justin.tv by Yale graduates Justin Kan and Emmett Shear. By 2013, the company had become profitable and had over 43 million monthly users. A year later, in 2014 after speculations about a YouTube acquisition, Amazon acquired Twitch Interactive for USD 970 million.

Here and Now

In recent years, the majority of developments in social media were either security breaches and other difficulties or mergers and acquisitions, with a few notable exceptions.

In 2015, Discord, an instant messaging and VoIP social platform, was founded. It soon became widely used by esports and LAN tournament gamers and benefited from relationships with Twitch streamers, as both platforms reach out to similar user groups, especially gamers.

In 2016, Mastodon, a free, decentral, and open source software to create social networking services based on open standards and protocols (commonly referred to as the “Fediverse”), was launched.

In 2017, ByteDance acquired Musical.ly for \$1 billion while also launching short video sharing service TikTok. Far-Right microblogging site Gab also started in 2017, while AIM and Beme were shut down.

In 2018, Yahoo! Messenger was shut down, and Musical.ly got merged into TikTok. Another self-proclaimed “Free Speech” network, Parler, started the same year, also primarily used by right-wing and other extremists or conspiracy theorists, especially after the COVID-19 pandemic started in 2020. While he did not go through with it, Kanye West considered buying Parler after he was banned from nearly every other major site following antisemitic statements [46]. In April 2023, soon after they purchased Parler, the CEO of the new owner Starboard had it shut down, citing that “No Reasonable Person Believes Twitter For Conservatives Is A Viable Business Model” [52].

In 2019, Google+ was shut down, and Verizon sold Tumblr to Automattic, the owner of WordPress.com and key supporter of WordPress for less than \$3 million [43].

2020 saw the launch of the audio-chat messaging app Clubhouse and BeReal, a social media app with a focus on authenticity. Especially in an era dominated by “Fake News,” it gained popularity since then.

In 2021, both Gettr, another social media platform for unfiltered content mostly from Alt-Right users was founded by Jason Miller, a former aide to ex-President Donald Trump, and Trump himself started Truth Social, based on Mastodon, but without being open to the Fediverse [45]. After it had started as a Twitter project to create a decentralized social network protocol, in October 2021, Twitter co-founder and former CEO, Jack Dorsey as well as Jay Graber, who used to work for crypto company Zcash founded Bluesky Social. Graber has been the Bluesky CEO since then. While Bluesky had received funding from Twitter through Elon Musk’s takeover, it raised \$8 million in a seed funding round in July 2023, in order to be financially independent from Twitter under Musk. A few weeks earlier, in May 2023, Bluesky also made its social media client open source under the MIT license, after it had already published underlying protocols like the Authenticated Transfer Protocol (AT Protocol or atproto) the year before. Atproto is a federated protocol for building open social media applications. While not fully considered part of the Fediverse, there are efforts to create bridges between it and Bluesky. Given most of it is open source and shares goals with standards and protocols in the Fediverse, interoperability with Bluesky is likely going to happen sooner than later. An interesting feature of Bluesky is a multi-lingual approach. Posts can declare up to 3 languages. The list contains pretty much every known language, even Esperanto, Latin or Yiddish. Via “content languages” in account settings, users can select which languages they want to see in their social feed. Although some social networks like LinkedIn also offer i18n for profiles, the level of language support by Bluesky seems pretty unique. As of late September 2023, the number of Bluesky users exceeded 1.15 million. Still an

invite-only beta phase, it should grow even faster, once it was opened to the general public. Especially if the former Twitter network under Elon Musk degrades further into a right-wing boys club, starts charging everyone even for basic use, or a combination of these factors.

In 2022, Yik Yak returned to Android, after it had already been available on iOS the year before. In the summer of 2022, Google's Lambda AI passed the Turing test, followed by ChatGPT toward the end of the same year [49]. And of course, the dominating event of the year, particularly for social media, was Elon Musk's \$44 billion purchase of Twitter.

While Twitter had also blocked accounts earlier [50] soon after Elon Musk's takeover, a large number of accounts were blocked or suspended for sometimes dubious reasons, while others, mostly right-wing "conservatives," hate groups, anti-vaxxers, and similar conspiracy theorists, most notably Donald Trump himself, got their accounts reinstated. In an effort to mitigate the soaring losses of Twitter, a paid subscription replaced the prior verification of accounts. The vow to reduce bots and fake accounts also failed miserably, and now bots can even gain some sort of legitimacy by paying for the subscription, if those running them are willing to pay. While Musk reversed the ban on Trump's account, he openly supports Republican primary competitor DeSantis and even hosted a live event on Twitter announcing his campaign. However, that event became a disaster and humiliation for both, when almost nobody could attend the live stream and the video feed was practically nonexistent, leaving only their voice to be heard [53]. In late 2022, activists behind Occupy Democrats launched Tribel Social, a left-leaning, liberal social network with a motto of "morality, truth, and We the People first", adding to other Twitter alternatives. The site claims to have around half a million users.

In early June 2023, Reddit announced a steep increase in their API usage fees, hoping to boost chances of finally launching its long-announced IPO. According to the new pricing scheme, developers have to pay \$12,000 per 50 million requests, driving many smaller or community-driven apps using Reddit out of business. This resulted in an attempted uprising by many moderators for parts of the network named "subreddits." Most of them were suspended by Reddit, although a few later got reinstated.

One argument besides trying to please investors was the rise of AI solutions like ChatGPT or Google's Lambda AI harvesting information sources like Reddit, Wikipedia, and others for their training, while these sites don't get rewarded for it. There was a great outrage when Twitter, in a desperate move to gather more money, said it would charge \$42,000 for 50 million requests, which drove many smaller or community-driven sites like Unfollower Stats into shutting down as well. Despite Reddit's promise to avoid that kind of extreme pricing, their price is "still \$12,000."

On July 5, 2023, Meta, the parent company to Facebook, Instagram, or WhatsApp, launched a new “microblogging” service named Threads in an apparent blow to Twitter [57]. A decentralized social network, developed by Instagram, it so far also requires an existing Instagram account. Due to EU privacy laws, Threads is not available in the EU until further notice.

In the first few days, it was possible to install and use Threads via mobile VPN, so I gave it a try, but Meta prevented that, leading to a decline in usage after an initial surge to over 100 million users. It seems Threads could soon be used in the EU and other countries without VPN.

On July 24, 2023, Elon Musk had Twitter’s name changed to “X” [58]. Hoping to mimic some of what WeChat does in China, Musk seemingly ignores that what’s possible in China with a different approach to privacy and the power concentration by a single company (as long as it plays by the rules of the political establishment) may not work in other countries, even the United States, let alone EU countries. The idea for “X” (oddly enough, Google/Alphabet also has a somewhat secret “Skunkworks” kind of lab named X) is not new, and Elon Musk already registered the domain back in his PayPal days; before the company became PayPal, it was already called “X.com”, but he was ousted after a somewhat hostile takeover (note the irony) by X’s biggest competitor Confinity with their product “PayPal” and replaced by Peter Thiel as CEO. A key reason was Musk being torn apart by many different ideas and goals for “X”, while the others led by Thiel just wanted to focus on payments, which the company also succeeded until today.

Of course Musk is now much wealthier than Thiel and currently the richest man in the world, but it remains to be seen which of the many ideas for “X” he’ll accomplish this time and which of these services (most will be paid and likely more than just 8\$ per month) users accept to pay for, instead of using them elsewhere, including PayPal, Stripe, Amazon, and many others for online payments. Not to mention possible antitrust violations, if the app became too big or say, future buyers of a Tesla were forced to use the X payment system only, or by forcing everyone to watch SpaceX launches on X instead of YouTube despite a worse user experience and performance. Shortly after the name change, the “Twitter bird” was replaced by an “X” logo that bears the sentiment of the X Window System, and terms like “tweet” were replaced by “post”, just like any other social network, losing even more of the unique brand recognition it once had. On September 18, 2023 Elon Musk announced that he might put X behind a paywall for all users, followed by a trial run of charging a so-far “symbolic” 1 \$ in the Philippines and New Zealand. Although he claims to fight bots and fake accounts, it’s the latest desperate

measure to get some money out of the expensive toy. Many experts agree, it could be the final nail in the coffin of X/Twitter and its user base may sooner than later shrink to a level of MySpace or Truth Social.

Future

Social networks have always existed, since people first started to communicate. Technical means changed over time and are likely to change even faster in the near future. Some services will be merged; others might become irrelevant and vanish sooner or later. Using vendor-neutral standards and frameworks that won't tie you into the offerings of just a single provider is crucial, unless you want to spend more time on rapidly changing APIs than actually using it for something productive, or worse, having to switch over to another provider if proprietary API and framework offered by a particular vendor are no longer available. While not a social network in the sense of Twitter or Facebook, one of the first crypto trading bankruptcies of Mt. Gox [7], long before the likes of FTX, BlockFi, Celsius, or Voyager, was a good example for such a dilemma. It used to be a market leader in this area for some time. Therefore, applications and e-commerce solutions offering Bitcoin through its API were forced to rewrite or throw those apps away.

If a vendor-neutral abstraction is created on top of such API, then it is much easier to cope with problems and changes like those caused by a vendor going out of business, being taken over by others, or a combination of both, like it still keeps looming for Twitter/X since the Elon Musk takeover and subsequent rebranding.

This is where vendor- and social service-neutral approaches like the Fediverse, Agorava, Keycloak, or Jakarta EE come into play.

Summary

In this chapter, we learned about the history of social media, its boom years, what is happening right now, and where the future direction could lead to. As well as how mergers and acquisitions can sometimes pose a risk for your social media strategies, especially if some of the new owners are double-minded and eccentric to put it mildly.

CHAPTER 2

Social Use Cases

In this chapter, we are going to explore the various use cases for social media, from general purpose networks to technically specialized ones like media sharing, as well as vertical social networks catering to a certain target group.

Types of Social Networks

There are numerous social media websites either for general purpose or focus groups and specialized communities, including former alcoholics, music fans, developers, expats, mothers, students, teachers, government employees, and people who are into gardening, knitting, or BDSM. The “Fifty Shades of Grey” books and films probably added even more shades to that list [17].

Traditional Social Networks

Most people are familiar with traditional social networking sites like

- Facebook
- Twitter
- Mastodon
- Myspace
- WeChat
- Sina Weibo

These platforms help us connect with friends, family, fellow students, or people who share common interests.

Business and Enterprise

These are popular social networks for business:

- LinkedIn
- XING

These are mostly used for work or job seeking, as a digital CV. LinkedIn was purchased by Microsoft and is a global player. XING originated in Hamburg, Germany, and is therefore active mostly in Europe. It acquired several other job portals or hiring services, as well as InterNations, the biggest social network for expats, adding users in 420 global communities anywhere from Honolulu to Auckland.

Messaging Services

These are the most popular social messaging services:

- WhatsApp
- Facebook Messenger
- Telegram
- Discord
- Viber
- WeChat
- Snapchat
- Line
- QQ
- Signal
- KakaoTalk
- Zalo

Media Sharing

Media sharing sites fall into three categories:

1. Audio sharing
2. Image sharing
3. Video sharing

Audio Sharing

Audio sharing can be

- Music sharing/streaming
- Podcasts
- Audiobooks

Music Sharing/Streaming

There are several music sharing and streaming portals. One of the earliest, founded in 1996, which still exists, is the Live Music Archive (LMA). It provides over 250,000 live concert recordings of mostly indie artists but also some big names like the Grateful Dead.

Also, around the turn of the century came Napster, founded by Sean Parker, who later came to fame and fortune with Facebook. It was mostly decentral and free but in its original form had been forced to shut down due to copyright infringement. However, its third iteration still exists today.

While Apple Music started only in 2015, its roots go back to Apple iTunes, in existence since 2001.

Many music sharing sites were started in the prolific years for social media between 2001 and 2010, among them:

- Myspace
- DatPiff
- Jamendo
- Mixcloud

- Musopen
- Spotify
- SoundCloud
- Deezer
- Noise Trade
- Playlist
- StarMaker
- Smule

Besides Apple, Internet and social media giants Amazon and Google also provide music downloads and streaming, sometimes through various brands like Google Play Music and YouTube Music.

Podcasts

The Podcast was invented by Tristan Louis and Dave Winer in 2000, based on the RSS format. Initially called “Audioblogging,” British digital journalist Ben Hammersley coined the term “podcast” in an article for *The Guardian* from 2004. The inspiration was Apple’s iPod music player.

Obviously, Apple was among the first to offer podcasts on iTunes. Nowadays besides radio and TV stations, all major players in music and streaming also provide podcasts.

Audiobooks

There is a thin line between podcasts and audiobooks; both are often hosted by the same channels. First invented by Thomas Edison through his phonograph, audiobooks originally targeted mostly blind people, allowing them to listen to stories instead of reading them.

Audiobooks evolved with recording devices from audio cylinders for almost 100 years to acetate and vinyl discs, compact cassettes, minidisks, CDs, or DVDs and ultimately solid-state storage like the iPod or server racks of a streaming server.

Besides book publishing houses and radio or TV stations, audiobooks are offered by most major Internet giants and providers of podcasts or music streaming services.

Image Sharing

As we learned, the first social network to upload pictures was Hot or Not in 2000. The first camera phone was created three years earlier by former Borland founder Philippe Kahn, with almost MacGyver improvised installations, to share the birth of his daughter in real time with selected friends [47].

These are some of the top image sharing apps:

- Adobe Creative Cloud – For Photoshop users
- Google Photos – Photo storage and backup
- iCloud Drive – Photo storage backup for Apple users
- Instagram – Instant messaging and photo sharing
- Pinterest – Visually share ideas like recipes, home decoration, or other information
- SmugMug – Secure your photos
- Amazon Photos – For Amazon Prime customers
- Waldo – Pro-level options for photography corporations
- The Guest – Automatic photo uploader
- Internxt Photos – Exceptionally fast photo exchange
- Imgur – Content hosting site where you can view and share images, GIFs, memes, or videos
- FamilyAlbum – For family photos
- Flickr – Community of photographers
- Snapchat – Multimedia instant messaging
- Pixpa – Easily sell photos
- 500px – Sharing and communication

Besides those dedicated photo apps, nearly every major social networking site like Facebook or Twitter also allows sharing and storing images, although the level of convenience is not always a match to specialized photo services.

Video Sharing

YouTube revolutionized the way we watch and create videos. It could turn almost everyone with a mobile device into a director of photography and helped create a special kind of influencers: YouTubers, many of them earning money comparable to movie stars.

These are 11 important video sharing sites:

- YouTube
- Vimeo
- TikTok
- Dailymotion
- Metacafe
- Instagram IGTV
- Facebook Watch
- Kuaishou
- Periscope
- Utreon
- TED

Video Streaming

These are ten important video streaming sites:

- Amazon Prime
- Apple TV+
- discovery+
- Disney+
- Google Play Video
- Netflix
- Paramount+

- Twitch
- YouTube
- WOW

Many are video streaming channels, where studios rather than users themselves publish the content.

Even those mostly offer some degree of social interaction, from simple like (or dislike) buttons to reviews or even social gatherings like Amazon Watch Parties or the Disney+ GroupWatch feature.

Others, especially YouTube or Twitch, are social streaming sites where members of the community share live streams, often computer gaming, esports, education, concerts, or similar live events. Both “YouTubers” and Twitch “Streamers” can sometimes reach fame and fortune, if their content attracts millions of followers, which also leads to six- or seven-digit annual income for some of the top content creators.

Blogging and Writing

These are the best social media platforms for bloggers and writers:

- Tumblr
- Facebook
- Pinterest
- Medium
- Instagram
- Goodreads

Discussion Forums

While there can be heated discussions on Twitter (even more, after Elon Musk took it over and opened the floodgates to right-wing conspiracy theories) or Facebook, discussion sites like Reddit and Quora are specifically designed to spark a conversation.

These are popular social media discussion forums:

- Reddit
- Facebook
- Quora
- LinkedIn
- Stack Overflow
- Digital Point
- Webmaster Sun

Review Sites

The top ten review sites are shown in Table 2-1.

Table 2-1. Best Review Sites

Site	Category	Avg. Monthly US Traffic	% US Traffic (Total)
Google Business Profile	Any business	158.03 million	19.6%
Amazon	E-commerce	85.44 million	63.6%
Facebook	Any business	85.57 million	23.1%
Yelp	Any business	40.47 million	87,5%
Tripadvisor	Food, restaurant, travel	28.27 million	50.4%
BBB (Better Business Bureau)	Any business	6.15 million	72.1%
Yellow Pages	Any business	10.5 million	70.0%
Manta	Any business	6.48 million	67.0%
Angi	Services	5.44 million	72.4%
Foursquare	Mostly shops and restaurants	3.67 million	19.3%